December 1941

TECHNOLOGY REVIEW

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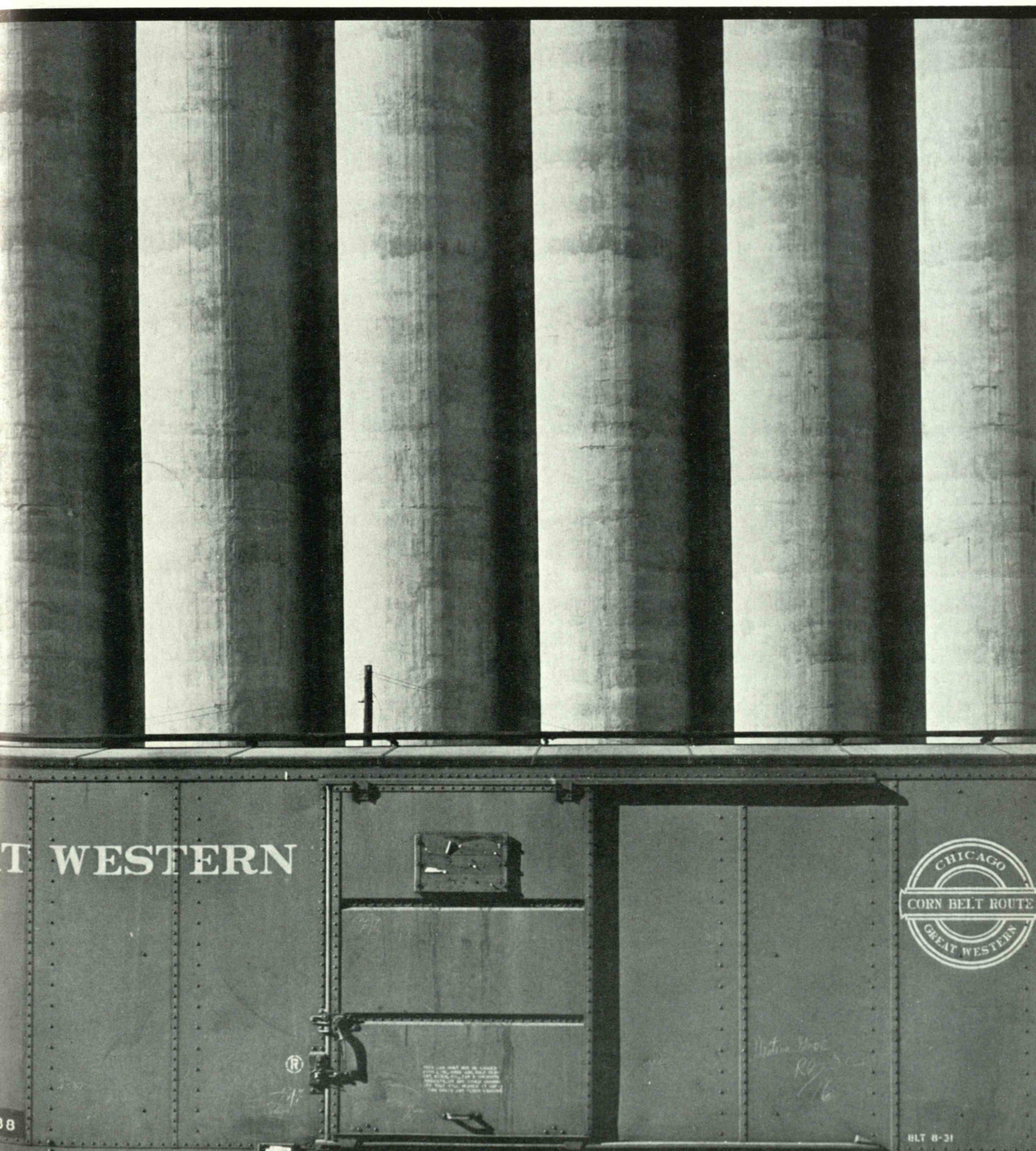

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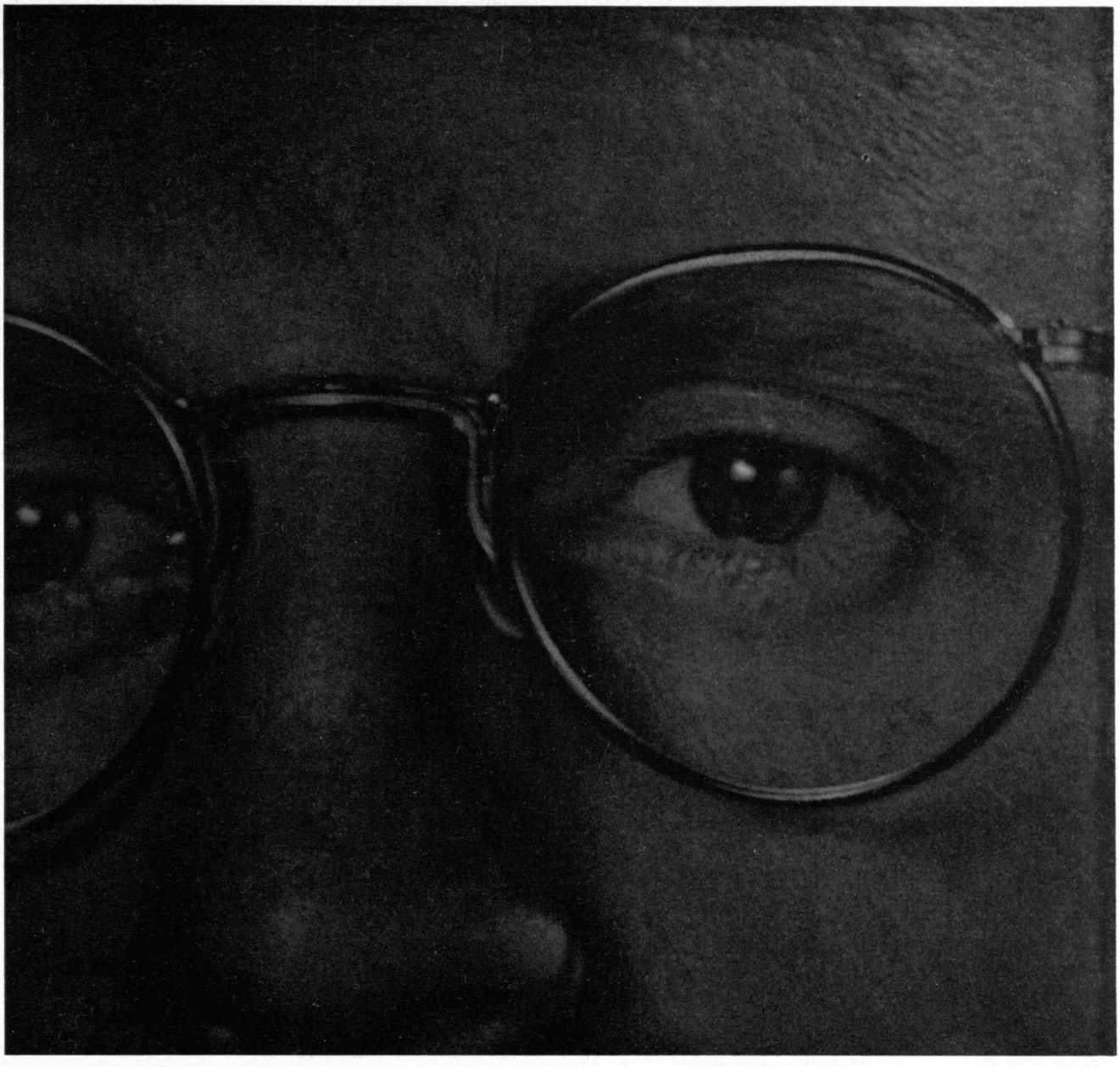

NO BLACKOUT for INDUSTRIAL EYES

Last year, eye accidents blacked out more National Defense production time than strikes. Today unprotected eyes are Un-American.

It costs less to install an adequate eye protection program than to pay the consequences for not doing it,—for even the slightest eye injury costs more than the American Optical goggle that would have prevented it.

American Optical Company makes a complete line of eye protection equipment. Send for an AO Safety Representative today. He will help your Safety Director to spot the eye hazardous jobs and select the proper goggles to fit the workers.

American Optical Company

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MANUFACTURERS, FOR MORE THAN 100 YEARS, OF PRODUCTS TO AID AND PROTECT VISION

THE TABULAR VIEW

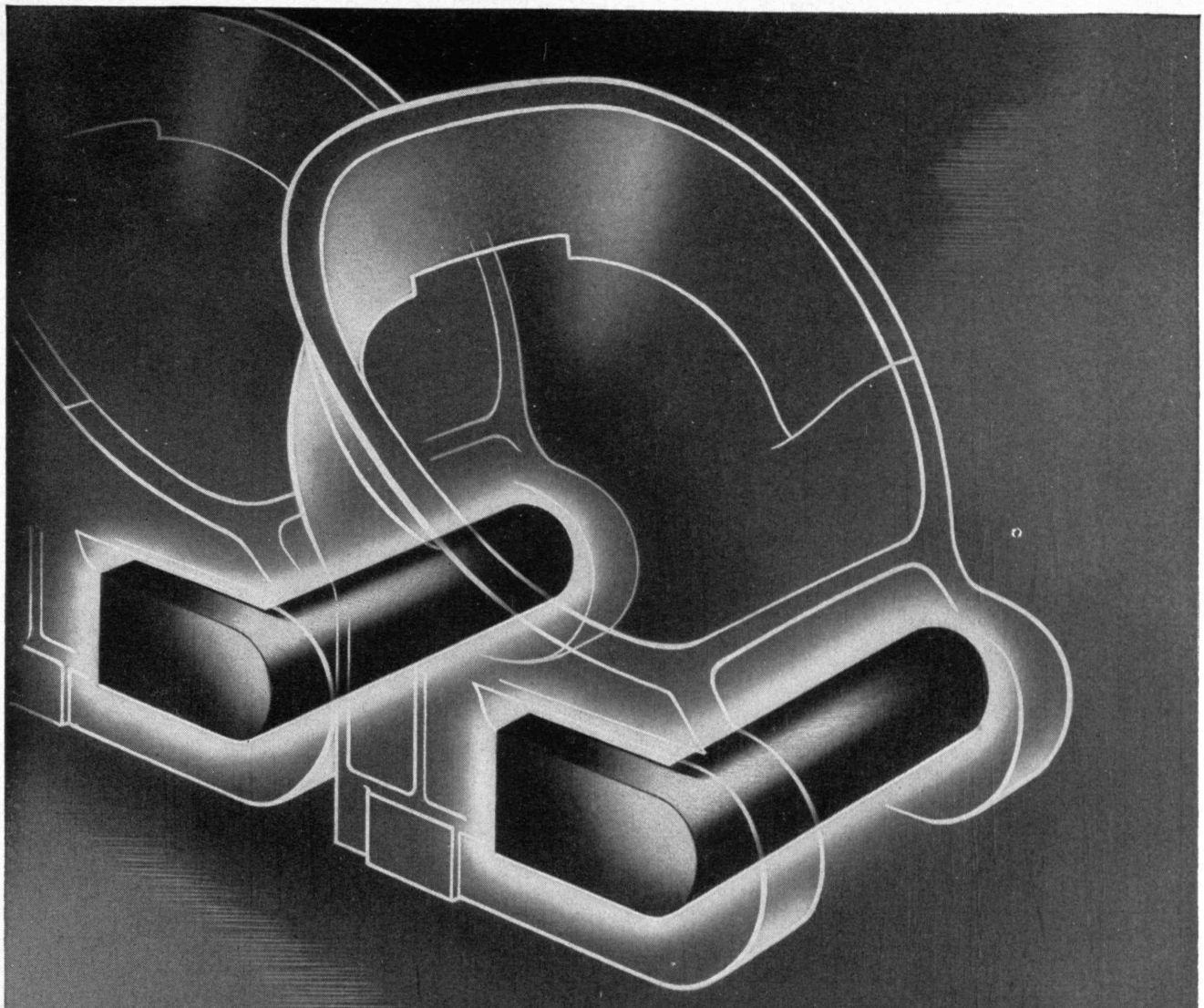
Authorial Alumni. — The pens of Technology Alumni are decidedly prolific, as this issue of The Review evidences. Two books by ROYAL BARRY WILLS, '18, are commented on in the Trend of Affairs, as is another narrative of engineering achievement by DAVID O. WOODBURY, '21. From S. PAUL JOHNSTON, '21, The Review offers (page 77) discussion and description which do for the Army Air Force what Mr. Johnston's paper of last June did for the organization of America's naval aviation. That paper constituted a chapter from his well-received *Flying Fleets*. A still earlier one, in December, 1940, was published in advance of its appearance in the book, *Horizons Unlimited: A Graphic History of Aviation*. This month's article will appear subsequently in *Flying Squadrons*, which Duell, Sloan and Pearce, Inc., have scheduled for appearance within a short time. Mr. Johnston is co-ordinator of research for the National Advisory Committee for Aeronautics.

Functionalism. — Many pragmatic applications of technology are by no means a monopoly of machine civilizations. This conclusion is implicit in the report brought by NEILL JAMES (page 69) from her experiences among the Laplanders of arctic Scandinavia. Miss James, as a "petticoat vagabond," has journeyed considerably in far places.

Planks to Plies. — From thicker to thinner appears to be the course of man's utilization of wood. The development of plywood in many forms for many uses may be regarded as marking the end of a period of extreme familiarity with, but an extreme ignorance about, wood. Even so, the research that has been done on metals very far exceeds that yet done on wood, so that the problems of the more economic utilization of this resource offer great opportunity for the ingenious and the studious. Describing the development of modern plywood and some of its numerous applications in the defense effort, THOMAS D. PERRY, '00, provides (page 72) acquaintance with some of these possibilities. Sales and development engineer with the Resinous Products and Chemical Company, Mr. Perry is another Technology author; a volume by him, *Modern Plywood*, is appearing under the imprint of the Pitman Publishing Corporation.

A Sense of the Dollar. — WILLIAM A. RHODES, '12, occasionally reduces to writing the results of a speculative turn of mind about topics often ignored. In this issue of The Review (page 75) he analyzes the wherewithal, coming to conclusions which suggest that the love of money properly modulated may be the root of good as well as of evil.

"To Search Out the Matter." — Research has often been declared a condition of modern progress. Its stimulative and regenerative values are discussed for The Review (page 79) by PAUL COHEN, '35, Editorial Associate and frequent commentator upon various social aspects of scientific and technological culture.



Dredge bucket pins demand a lot from steel—and get it in Chromium-Molybdenum (4142)

Dredge bucket pins are heavy (4-8 inches diameter), must withstand heavy static and impact loads, and must have extra good wear resistance. It is a tough assignment for any steel.

A Chromium-Molybdenum (4142) steel developed for uniform hardness in heavy sections has recently been specified for this application. It has proved its worth in service.

Here is a new, permanent place for one of the most versatile of alloy steels—a steel that, with minor variations in carbon and manganese content, is meeting requirements in parts ranging from 0.065" wall aircraft tubing to 12" diameter shafting.

Our booklet "Molybdenum in Steel" will gladly be sent without charge to those interested in modern materials for modern needs.

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MAIL RETURNS

The Strong, Simple Virtues

FROM FLORENCE W. STILES, '22:

One would hardly expect to find reference to the strong, simple virtues in such a book as "Tax Systems of the World," a yearbook published by the Tax Research Foundation, which contains legislative and statistical information on all the states of the United States and certain Canadian and foreign data. Yet the following excerpt, which was written by the editor-in-chief, Mayne S. Howard, former deputy commissioner of the Department of Taxation and Finance of New York and now organizer and director of research of the Tax Research Foundation, is most apposite to the letter from Gregory M. Dexter, '08, in the November Review.

To quote: ". . . This book includes as an integral part of the project the idea of bringing together in compact form some of the more essential facts of the world considered as a single economic apparatus. The four primary economic facts of a society are doubtless area, population, wealth and income. Wealth and income would seem to be materialistic measures but such is far from the case. *They reflect the intellectual and moral characteristics of a population. The greater the intelligence and education, the greater the sobriety, the greater the industry, the greater the respect for the rights of others, etc.* [italics mine], the greater is a society's wealth and income. . . ."

Mr. Dexter is looking at the results of a bad situation and not at the causes. What is back of poor housing and malnutrition? That 60,000,000 people in the United States do not have sufficient income to afford the necessities of life proves that conditions today call for a willingness to recognize the strong, simple virtues, such as sobriety, industry, and respect for the rights of others on the part of all who are supposed to be intelligent and educated, and for the courage to act. There are no radiant, glittering halos on the strong, simple virtues. The practice of these virtues calls for strong character, unselfishness, sacrifice, and a good education. It also calls for a sense of trends, an ability to evaluate in order to put firsts first.

Cambridge, Mass.

Maine Shipbuilding

FROM CHARLES S. MORGAN:

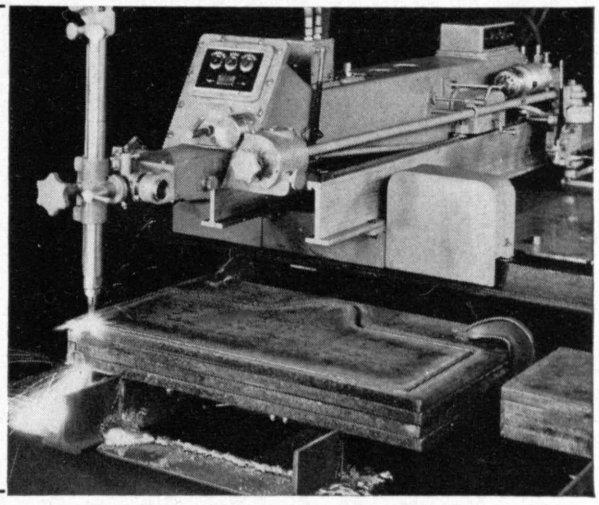
Congratulations to The Review and to Richard Hallet on the article "Wooden Ships and Maine Builders" which appeared in the November issue. It is a real contribution to the history of Maine wooden shipbuilding. . . .

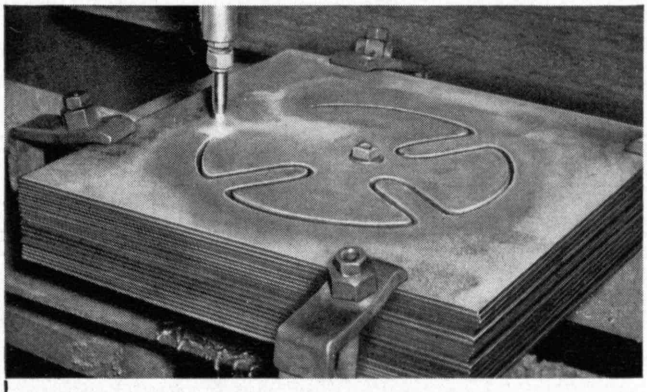
Boston, Mass.

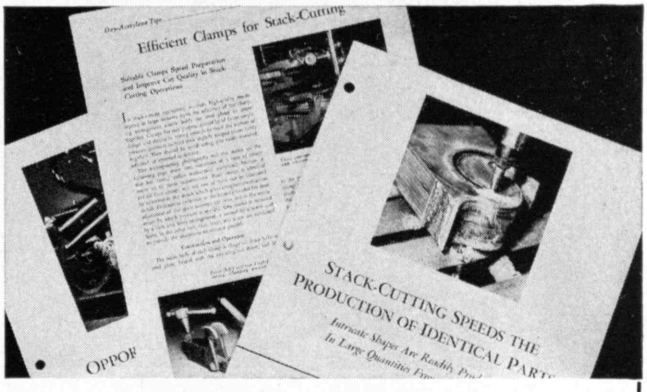
OXY-ACETYLENE STACK-CUTTING Quickly Produces Identical Parts from Stock Steel

1. What it is

Oxy-acetylene stack-cutting is an adaptation of the flame-shaping process. This method produces quantities of identically shaped parts of practically any size from clamped piles of steel plates or sheets. Steel ranging in thickness from 16 gauge to 1 inch is being cut with good results—in piles as thick as 5 inches. If the plates are correctly clamped, the cut edges are clean and smooth. Stack-cutting can be done with either portable or stationary flame-cutting machines. In the illustration at the right, an Oxweld cutting blowpipe is slicing through 4 plates, each 1 inch thick.







2. How it saves

Oxy-acetylene stack-cutting produces needed parts from stock steel quickly, and usually at lower cost than parts already shaped can be obtained. Stack-cutting is in most cases a faster and cheaper method than shaping single parts by mechanical means, and it also helps conserve steel because it reduces scrap losses. Additional savings result when machining operations are done on the flame-cut stacks before the parts are separated. The uniformity of stack-cut parts facilitates fabrication and assembly.

3. Linde can help you use it

Linde can help you determine where and how you can profitably use Oxweld flame-cutting equipment for the shaping of parts by stack-cutting. In addition to supplying the oxygen, the acetylene, and other essential materials, Linde also makes available to its customers, motion picture showings, how-to-do-it literature, and on-the-job service which help operators do a consistently good stack-cutting job. If you want to know more about this process—or about any other oxy-acetylene process—*ask Linde!*

THE LINDE AIR PRODUCTS COMPANY

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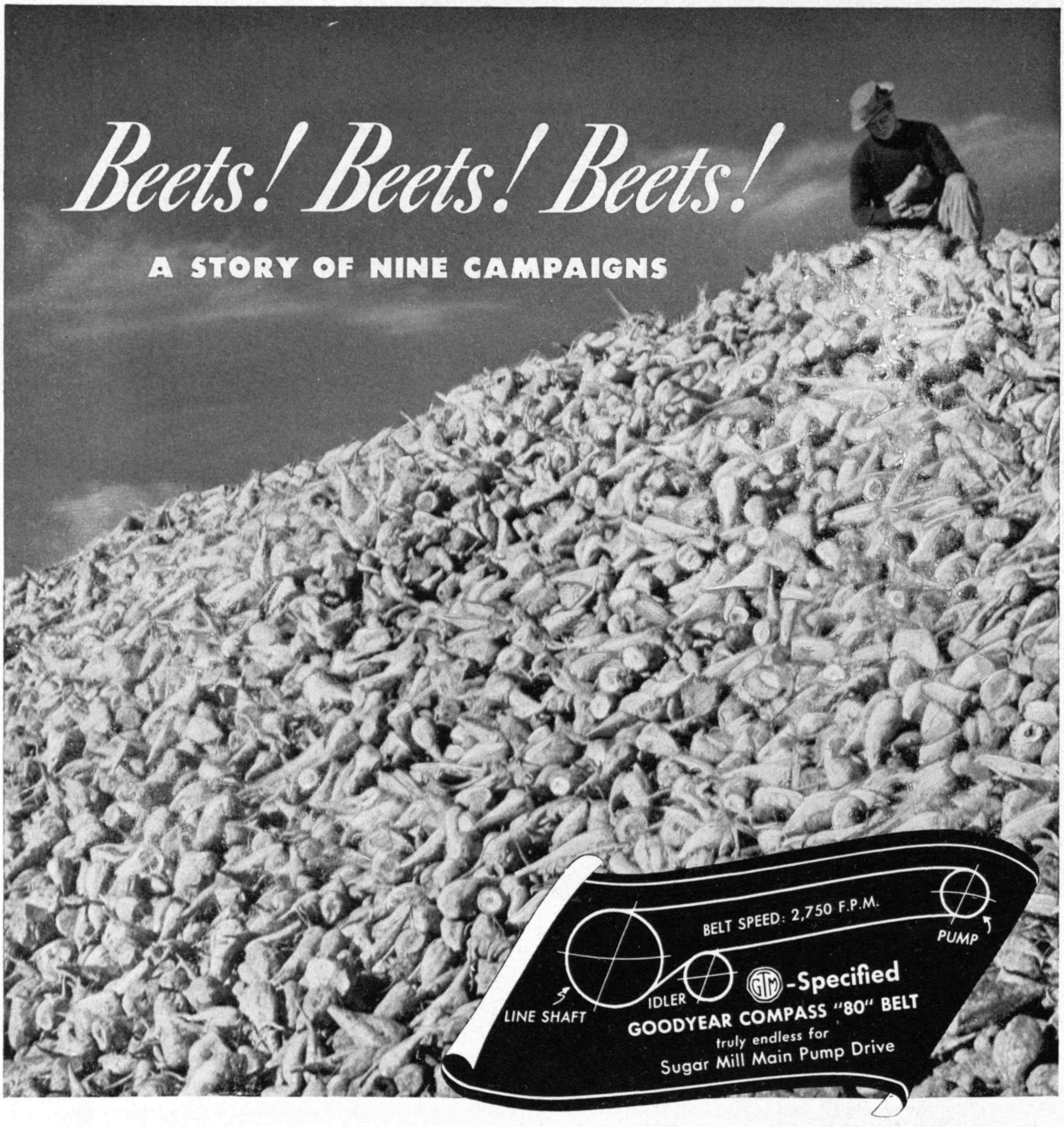
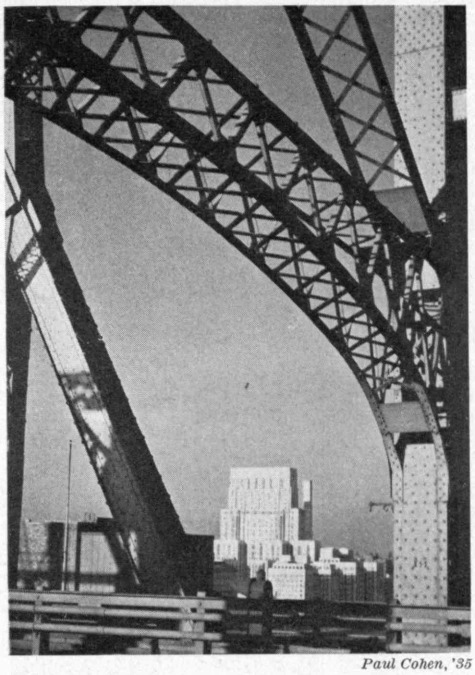
LINDE OXYGEN . . . PREST-O-LITE ACETYLENE . . . UNION CARBIDE
OXWELD, PUROX, PREST-O-WELD APPARATUS . . . OXWELD SUPPLIES



A CAMPAIGN is what sugar men aptly call the busy fall weeks when many mills run continuously, night and day, converting mountains of beets into sugar. During every campaign one big West Coast mill used to have several costly shutdowns due to belt trouble on its main pump drive. The costliest "double" belts stretched and stretched beyond take-up limits, making frequent resplicing necessary, and lasted only two seasons. So back in 1932 an S.O.S. was sent for the G.T.M.—Goodyear Technical Man. After careful analysis, he recommended a Goodyear COMPASS "80" truly endless cord belt. During its first campaign the COMPASS stretched only one and a half inches, easily adjusted on the sliding take-up without stopping operations. This fall it is finishing its ninth campaign without another adjustment, without a single repair. It has given more than 25,000 hours' trouble-free service; more than four times longer wear than costlier belts; increased production. Countless records like this show why you save time and money, and conserve rubber for defense, by consulting the G.T.M. Write Goodyear, Akron, Ohio or Los Angeles, California—or phone the nearest Goodyear Mechanical Rubber Goods Distributor.

Compass—T.M. The Goodyear Tire & Rubber Company

THE GREATEST NAME IN RUBBER
GOODYEAR



Paul Cohen, '35

From Queensborough Bridge, Rockefeller Center in New York

VOLUME 44 NUMBER 2

THE TECHNOLOGY REVIEW

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AT THE MASSACHUSETTS INSTITUTE OF TECHNOLOGY

CONTENTS for DECEMBER, 1941

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James N. Doolittle

Tree and cloud

THE
TECHNOLOGY
REVIEW

Vol. 44, No. 2

December, 1941

The Trend of Affairs

Caches for Suburbia

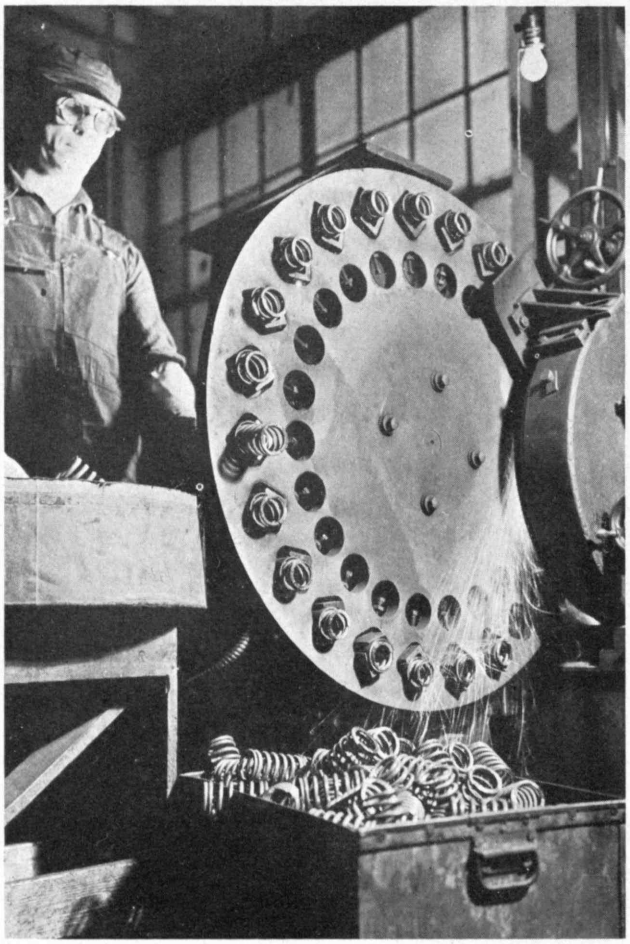
IT is to be observed that dogs bury bones, not beefsteaks. These sagacious creatures are apparently aware that steaks do not improve by interment in the earth. Like a long list of other valuable and important foods, meat can be held in its most nutritious state only if refrigerated. About the sole person to whom this situation is not a problem is the Eskimo, who builds up a cache of winter food on what corresponds to our front porch, then obtains his daily needs by stepping outside and hacking off a portion as required.

For dwellers in more temperate climates the process is not so simple, even with mechanical refrigeration. The ordinary household refrigerator, the interior of which is maintained at perhaps 40 to 45 degrees Fahrenheit, is not cold enough for prolonged storage. On the other hand, the benefits of the central cold-storage plant can be made available only by an elaborate distribution system, including refrigerated transportation and refrigerated retail selling space, and then mainly to urban populations. The farmer must often meet the problem by less satisfactory expedients, such as smoking or salting, and his winter diet, particularly if he lives in the South, is frequently ill balanced.

To a certain extent a remedy is found in the cold-storage locker system. Under this method, which in the United States now has almost a million patrons, most of them farmers, an individual hires space in a properly refrigerated plant, where he then stores food of his own choice, and perhaps of his own raising, in semi-wholesale quantities. A locker of average size — about six cubic feet — can hold some 250 pounds of food and rents at perhaps $10 a year. To make such a locker a worth-while investment obviously requires a fair amount of planning and careful buying by the individual family, but since the plants generally have facilities for slaughtering and dressing livestock, farmers in particular have the opportunity of making substantial savings in their food costs.

Although about 3,700 locker plants are reported to be in operation in this country, ranging from a group of twenty lockers run in connection with a country store to big city plants containing two thousand lockers, extensive use of them dates from about 1936. The industry is still quite fluid, with innovations in method and equipment occurring frequently. One of the most interesting of these is an attempt to meet the very common complaint voiced against the lockers — the inconvenience of visiting the central plant whenever the family larder must be replenished.

Operators of cold-storage plants and manufacturers of refrigerating equipment are hence turning their attention to the possibility of installing low-temperature storage capacity in the home, that is, equipment which can maintain temperatures of about 0 degrees Fahrenheit. One home unit now being marketed in the Boston and Chicago areas consists of a compartment of 4.4 cubic feet which can be maintained continuously at temperatures down to −20 degrees Fahrenheit. It is thus suitable for storing anything from the haunch of a bear shot by the family Nimrod to several weeks' supplies of quick-frozen foods. The reference to the bear is not exaggerated, since the ice plant distributing the units in Boston reports that frequently the opportunity to store game has been a primary inducement to the buyer. While the saving which will result from the use of such a unit is hard to estimate, because differences in quality often make comparison between food costs difficult, the prices of quick-frozen foods, which in practice are one of the important classes of food being handled in these home lockers, appear to run about 25 per cent lower when the products are bought in wholesale packages.



Norton Company

Coil springs go for a ride on a Ferris wheel in this grinder, which is used for squaring their ends.

The interest of cold-storage plant operators in the sale of these units arises from the fact that the decline in the use of ice for home refrigeration (and no reversal of this trend is foreseen) has left the operators with excess capacity, both in their specialized distribution service and in their plants. The sale of quick-frozen and other refrigerated foods would be an excellent substitute source of income. A major difficulty here, however, is the lack of adequate storage capacity in the home, most of these foods requiring temperatures of from 0 to 10 degrees Fahrenheit if the foods are to be held for more than a day or two. About the only place in which a householder can keep a quick-frozen package now is the ice-cube compartment of the refrigerator. The distributor dislikes to sell in such small units and would far prefer to sell a week's or two weeks' supply at a time.

As far as city dwellers are concerned, the home lockers so far available are more or less luxury items. But no basic patents exist in the field, and when materials again become freely available, thousands instead of hundreds of units may well be sold. Possible extensive use of the machines in retail stores for ready availability of frozen foods is also foreseen. Offering opportunity to enjoy a wider variety of fresh foods and also a chance to save on food costs, they definitely point toward a higher standard of living.

Camelback

THREE-QUARTERS of our annual consumption of rubber goes into the automobile tire and its accessories, over 60 per cent into the tire casing itself. Faced with an urgent need to save rubber, manufacturers of tires have come to recognize and even praise, in a guarded sort of way, the retreading of worn tires, a practice which is now compulsory in Great Britain. The vulcanizing of new rubber treads to worn but sound tire carcasses has been practiced for years by the United States Post Office and many other owners of fleets, and has recently been adopted by the Army with the recommendation of the quartermaster general's office.

Barring damage to its structure, a tire carcass can outlive one to four treads of "camelback," as the rubber compound used for retreading is called. Since the original tread accounts for only about 35 per cent of a tire's first cost, and since high-quality camelback properly applied to a good carcass may be expected to wear almost as long as the tread the purchaser got originally, large savings in tire costs are possible. Passenger-car as well as truck tires may be retreaded.

Building and the Budget

BOTH sides of the matters financial involved in the practice of architecture come under review in two books by Royal Barry Wills, '18. Addressed to young men setting out in the profession, the first,* written with the collaboration of Leon Keach, '17, argues sensibly that "the practice of architecture has been forced to take a course in business and to accept efficient, aggressive organization as the price of survival." It then reduces that sententious abstraction to twelve chapters of common-sense counsel drawn from long experience. Such matters as the diplomatic handling of difficult clients, the reasonable way of systematizing office routine, keeping "overhead underfoot," estimating costs of service, making accurate and detailed records — all are explained in direct and applicable fashion. Throughout, the book is written with wit and sympathy, and with a turn of wry humor that should go far toward disabusing the youthful practitioner of an excess of starry-eyed notions.

The same quality of shrewd insistence on thriftiness so far as it is compatible with good results marks the second book,† which is addressed to the person who wants to own a friendly and attractive house and at the same time to stay safely within the limits of his budget. Considerable space is devoted to "dollar savers" and to discussion showing how a minimum plan can be expanded as the family income allows. But the book is not by any means concerned only with making the money go as far as possible. Mr. Wills in his introduction comments pungently on architectural philosophies and on manners in which possible clients may be addressed, observing that "it takes more than a lilac

* *This Business of Architecture* (New York: Reinhold Publishing Corporation, 1941), 210 pages, $2.75.

† *Better Houses for Budgeteers* (New York: Architectural Book Publishing Company, Inc., 1941), 102 pages, $3.00.

bush or a skeleton wrapped in cellophane to make a good house," and holding unshakably to his position that "the house should be bent to fit the family — not the family to fit the house." Sketches and plans of a good number of dwellings classified according to income groups constitute the major part of the book. Comment and analysis accompany the sketches.

Seeking Aluminum

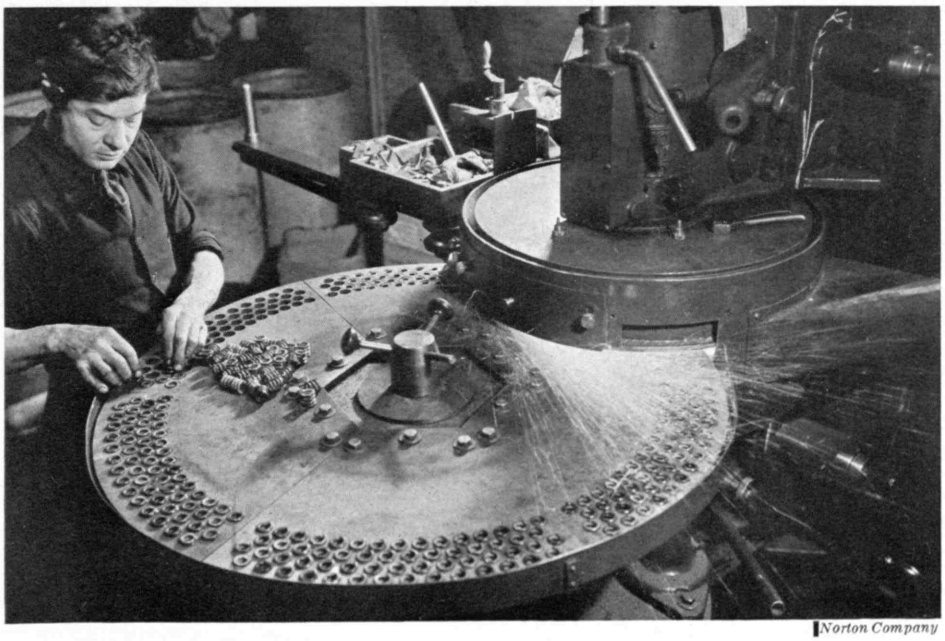
ALUMINUM, of pronounced importance in national defense construction, is a somewhat paradoxical metal. Precious because of its many virtues, lightness in weight being conspicuous among them, it is one of the most common constituents of the earth's crust. The alumina from which it is made is almost everywhere; at the same time, extraction of the ore is so difficult that very large portions of the nearly limitless supply have not been tapped.

Corundum, in which the greatest concentrations of alumina exist, is a comparatively scarce substance. But bauxite, which may contain as much as 65 per cent of alumina, is available in fairly generous amounts in various parts of the world. These are the aristocrats among aluminum "ores." Going down the scale, concentrations of alumina in ores decrease in proportion as the ores increase in amount. Common clay, of which the world has unlimited supplies, contains alumina, for example, in concentrations as low as 4 or 5 per cent.

Naturally, in times of normal demand, it is more economical and efficient to work ores such as bauxite and secure the largest possible recovery from the operation. But as demand becomes abnormal and as importation of bauxite from other parts of the world faces increasing difficulty, metallurgists turn to study of ways of getting at the alumina in other materials. Such means must reckon with problems imposed by the fact that alumina is a gregarious sort of material; it readily takes on impurities and clings tenaciously to them. Hence those ores in which the concentration of alumina is relatively slight offer special difficulties in the necessity of eliminating many impurities. Of these the chief are iron and silica.

One process recently announced offers a comparatively inexpensive way of getting rid of iron and silica and thus suggests the possibility of relying on clays as a source of the aluminum oxide which, electrolyzed, provides the desired metal. In this process, the ores are roasted to destroy organic matter and reduce contained iron to the ferric state. Application of boiling hydrochloric acid produces a high concentration of aluminum chloride, with small amounts of ferric, calcium, sodium, and possibly potassium chlorides. After evaporation of much of the watery solution, the ferric chloride is separated with isopropyl ether. Thus freed of its iron, the aluminum chloride is then heated until it decomposes into aluminum oxide, hydrochloric acid, and water. The hydrochloric acid goes into the water and is recovered. The watery aluminum oxide is next heated to about 800 degrees centigrade, leaving an aluminum oxide virtually free of iron. Electrolysis by the familiar Hall process eliminates the oxygen, and the metal is ready for use. Both the hydrochloric acid and the isopropyl ether used in the process are relatively inexpensive.

Development of this method illustrates again, and very neatly, the interdependence of technologies and the fact that, in science, accomplishment is cumulative and accelerative. Knowledge that acids can be used to recover aluminum from clays is not new. A way of recovering and regenerating the acid and of separating the iron from the aluminum by acid became feasible in good measure because of the availability of corrosion-resistant containers. The development of plastics thus has contributed to the practicability of utilization of the alumina in clays, through providing acid-resisting synthetic plastics to supplement the acid-resisting ceramics, forms of rubber, and porcelains. The plastics industry has helped also through making organic acids like isopropyl ether available in large quantities.



Continuous operation is provided for by the Ferris wheel feed, the operator placing unground springs in position while others are being squared by the grinding wheel.

Norton Company

Tethering the Red Bull

THE relentless march of the Colorado River, which for millions of years had been cutting its canyon to the sea, was halted with the completion of Boulder Dam in 1935. It was the story of this great dam as an engineering achievement and the enormous economic and social influence of the dam on the people of western United States that David O. Woodbury, '21, chose as his task when he began writing *The Colorado Conquest.** He soon discovered, however, that the taming of the Colorado River by Boulder Dam was but an incident in an epic of the Southwest, the long and courageous struggle of the pioneers to irrigate the desert. His research on the history of the Colorado revealed all the essential elements of a democracy moving forward — local politics, government intervention, bureaucratic stupidity, the ambitions of men, finance, the inevitable loves and hates of plain people, and, in time, prosperity.

In *The Colorado Conquest* Mr. Woodbury has told the romantic story of one of America's great rivers by combining carefully documented fact with equally documented dramatization. Thus, the historic individuals who led the battle to control the Colorado and turn it to constructive uses appear under their own names. Beside them are prototypes, or symbols, as actual as the others but composites of the pioneers of the Colorado River country.

The story of the dramatic struggle to conquer the Colorado begins with the vision of Dr. Oliver Meredith Wozencraft, a young Texan who, in the spring of 1849, left his wife and three small children and rode on a mule into the West to restore his health. It was when he crossed the Colorado River near Yuma, Ariz., that his speculations began upon the possibility of guiding its water to the desert where, for lack of a drink, he had nearly died.

Dr. Wozencraft's dream of a desert turned to green fields was the beginning of a campaign to which he devoted years of his life to gain government support for a large-scale irrigation project. At the age of seventy-three, he returned to Washington, where he died while fighting to persuade Congress to pass a bill granting the state of California a large tract of land upon which the reclamation project might begin. Although Dr. Wozencraft's bill was not passed, his ambitious plan for cultivating the western desert stirred the imagination of others who followed him, and the battle to convert the treacherous Colorado into a beneficent ally was carried on.

The most spectacular stage in this long struggle concerns the tragic engineering experiments which marked the beginning of the conversion of the Colorado desert into what is now California's famous Imperial Valley, one of the country's most productive agricultural areas.

Impressed as he undoubtedly is by the human drama that forms the colorful background for his study of the Colorado River, Mr. Woodbury never neglects the engineering significance of every step of the long and difficult struggle against the silt-burdened floods of the Red Bull. It is an admirable history of a great engineering triumph in which American engineers created, in Boulder Dam, a monument to those pioneers of their profession who, one by one, died dreaming of turning the deserts into gardens.

* New York: Dodd, Mead and Company, 1941. xiv+367 pages. $3.00.

Pasticcio

SUCCESSFUL use of a commercial resin as artificial skin, painted on the patient's skin where a surgical incision is to be made, was reported at the recent meeting in Boston of the American College of Surgeons. This artificial skin is said to provide an effective means of preventing germs in the natural skin from infecting surgical wounds. Dr. Michael E. DeBakey and Dr. E. J. Giles of New Orleans, who presented a paper on the subject, said the artificial resin skin was 100 per cent sterile, transparent, a perfect fit, and nonirritating. ¶ The soft-face hammer, to many a cellar workshop enthusiast, is a contradiction (*Continued on page 100*)

Chester H. Pope, '09

Date palms in bloom in the Zoological Garden in São Paulo, Brazil

Necessity's Arctic Children

Logic and Adaptability Enable the Nomad Laplander to Live in Comfort; His Technology Is Ingenious and Rooted in a Long History

By Neill James

I HAVE always wanted to learn why so many "explorers" who visit the Arctic come away grateful for having escaped with their lives, whereas the natives live there in comparative comfort. During nine months of winter which I spent in Lapland, living in tents on the snow and traveling with the nomads who follow the reindeer herds, I developed a deep appreciation for the Laplander's adaptability and the logic of the equipment he has devised as protection against bitter winds, blizzards, and subzero temperatures.

These inhabitants of the fascinating Land of the Aurora Borealis are the most interesting race in Europe. In reality, there is no such political entity as Lapland. It is a phantom area which comprises the northern sections of Norway, Sweden, Finland, and northwestern Russia lying north of the polar circle, and through which a race of some 30,000 nomads is, by international agreements, free to roam with its herds of reindeer. The origin of the Laplander is shrouded in mystery. No one knows for certain whence he came. Ancient historians declared him to be related to the Finn. Many believe the race started its wandering across the steppeland of arctic Russia some eight thousand years ago and ultimately settled in the area where it has lived ever since.

Recognizing the Lapp's ancient claim to the northern sections of what are now Norway, Sweden, and Finland, these three governments, while encouraging him to remain a nomad, grant him protection and citizenship. A Laplander is considered to be a citizen of the country in which he spends the greater part of the year, and he enjoys all the privileges which this citizenship entails but is exempted from military service.

A strange, shy, honest, deeply religious people, the fair-complexioned, blue-eyed Laplanders live a permanent existence in a most impermanent manner and have a distinctive culture of their own, as well as rigid social customs. They have no immorality. They are not savages. They speak two, three, and even four languages in addition to their native Lappish, and education (provided by the host country) is compulsory.

Laplanders manage to wrest a living from the arctic clime, but that is about all. Few grow wealthy. Although they are on friendly terms with the Scandinavians, intermarriage is comparatively infrequent. When a Laplander abandons his distinctive and colorful native dress, settles in a log house, and adopts the customs of the Scandinavians, he is no longer considered to be a Lapp.

We customarily think of the nomad as a primitive man, yet he knew and practiced the technique of creeping motion, insulation, streamlining, and air conditioning for hundreds of years before modern man came upon the scene. Man progresses fastest when urged by the pinch of necessity. Doubtless the inventor of the snubbing effect on automobile tires thought he had something new in creeping motion. But the Laplander,

Stark against the arctic sky, this foxtrap stands like a symbol of mystery.

Streamlining as the Laplander has applied it in the design of his pulka, the boatlike sled characteristic of the country

impelled by the necessity for traction to enable him to run or walk upon the smooth, wind-swept ice of lakes and rivers, anticipated this invention by a thousand years, using the principle in the construction of moccasins. The Lapp also knew how to design his woolen tent, or *kåta*, to withstand the force of winds, storms, and blizzards long before engineers posed the problem of the wind resistance of skyscrapers. His sleds, or, rather, pulkas, are models of streamlining and balance; and he practiced "daylight saving" centuries before the two words were hitched together to mean that Americans had to get up an hour earlier.

The entire economy of Lapland is based upon the reindeer. This wonderful animal provides the Lapp with food, clothing, and material for barter. Because the reindeer migrate in herds across the frozen fjelds in search of food, and the Laplander must follow to protect the deer from wolves, he is of necessity a nomad. Throughout the period of some eight thousand years during which successive generations have trekked the wind-swept arctic fjelds, the Laplander has managed to perfect his limited equipment until the design of his tent, ski, clothing, and sleds cannot be improved upon.

Since the nomad who follows the herd leads a mobile existence, the family home — a woolen tent — is portable, light, easily taken down, and quickly erected. Yet it withstands the terrific pressure of blizzards and storms which sweep down from the north. The design — uniform throughout Lapland — is a squat, round structure which hugs the frozen earth. It has a smoke hole about four feet in diameter in the center of the top and resembles a large, brown beehive. A tent may become buried during the course of a winter storm, but it rarely, if ever, blows over.

Tent poles and covering are usually transported in the end sled when the family is on trek. Upon arrival at the camping place the erection of the tent takes precedence over all other tasks, with the exception of quelling a possible stampede among the herd. Having selected a level spot, men scrape away the snow while women cut birch twigs or reeds which serve as a floor after they are covered with reindeer skins. The framework of the tent consists of bent birch saplings lashed together with rawhide thongs. Two pairs of bowed birch poles are lashed to cross poles to form arcs. The two arcs, which are then set up, roughly form the four corners of the tent and are held in place by a ridgepole extending between the two cross poles. When in place, one set of bowed poles forms the front of the tent, the cross pole serving as a beam above the entrance. The second set of poles supports the rear. Other curved poles are lashed to the cross poles in the front and rear. Finally, the loosely woven woolen covering is stretched on and pulled well down to the earth, and snow is packed a foot deep around the tent. This snow, which holds the tent firmly in place, also serves to keep out drafts. No guys or pegs are used.

Within an hour after arrival at the spot selected for camping, the men have the tent up, the women have reeds in place, covered with skins, and a fire is burning in the center of the tent in the small circular space left bare of reeds. The aroma of coffee permeates the atmosphere, and the family is settled for another three weeks. No attempt is made to heat the tent. The fire, held within bounds by means of a short green log placed on either side, serves merely for light and for cooking and is permitted to die out at night. The temperature in the tent is usually a mere ten degrees higher than that outside, but even a fifteen-below-zero temperature seems warm and homelike when you've just come in from a long trip in twenty-five-below-zero weather with a bitter wind blowing.

So satisfactory is the design of the tent that no change is made in the general shape when the family builds a permanent structure for summer occupancy near the arctic fiords, whither the reindeer migrate to escape the mosquitoes. Additional poles are used in the framework of the summer tent, and it is covered with sod or turf instead of woolen. I saw several with the luxury of glass windows and a smoke hole which could be closed. On a platform near its sod *kåta* a family will frequently build a small storehouse, where foodstuffs are kept beyond reach of dogs. The innate honesty of the race

simplifies life. Locks and keys are practically unknown in Lapland. Precious reindeer meat need be hung only out of reach of dogs and wild animals. On the spring trek to the fiords, a Laplander family leaves its furs along the route as the weather warms. The valuable winter furs are simply stored on platforms or hung on trees. When the Laplanders travel southward toward the polar circle in late fall, they plan to arrive at the places where their winter furs are parked just in time to don them for the season.

In the interior of Swedish Lapland, the school dormitories for nomad children are *wooden* tents, while at the shore the children go to school in tentlike structures covered with turf. These low, rounded structures are storm resistant.

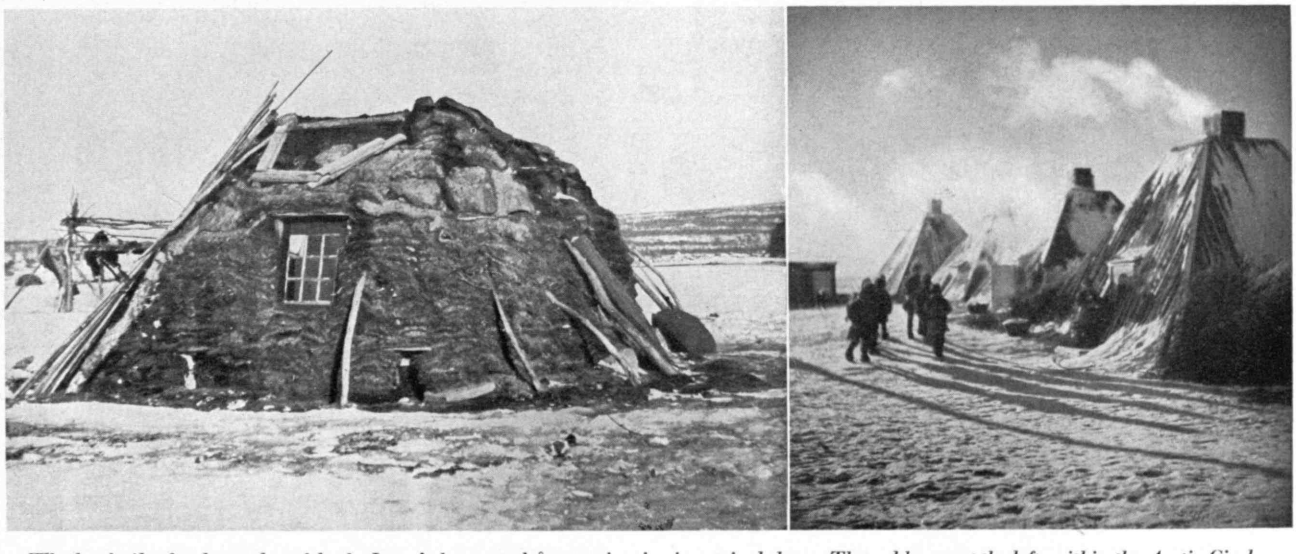
Lapland women are never idle. When visitors came to our tent, they brought along handwork, knitting, weaving, or perhaps a pocketful of dried reindeer sinews. These are chewed upon until softened and then spun into thread by being tied to a plummet and twirled. Sinews are used for sewing fur garments. The loom used in weaving the colorful bands for belts and moccasins is made of reindeer bone. Many Lapp women possess portable hand-operated Singer sewing machines which they keep stored in freight pulkas when not in use.

When my host had spare time, he'd bring in half a dozen frozen reindeer forelegs which had been hanging on the tree near the tent, and he would suspend them over the fire until they thawed. While they were thawing, he would busy himself making a pile of shavings from a birch stick. After he had skinned the legs, he would dry the green hides by sticking them onto the springy birch shavings to stretch them. Later the skins are tanned and made into moccasins and leggings.

Having arrived at perfection, Laplanders have not changed the design of their moccasins for centuries. My thick-soled oiled boots, roomy enough to contain my feet encased in four pairs of woolen socks (which I thought would be so warm in the arctic), were as refrigerators compared to the hay-stuffed fur moccasins which covered the sockless bare feet of the Lapp family with whom I lived. I soon discarded boots and adopted moccasins. Made of reindeer skin with the short hair left on, the moccasin is flexible. Its upturned toe serves to hold ski on.

Snowshoes are not used in Lapland, and one therefore has to step upon ski when emerging from a tent. The advantage of being able instantly to tuck the upturned toe of the moccasin beneath a loop on the ski without bother of stooping to fasten binders must be experienced to be properly appreciated. Moreover, the daily stuffing of fresh hay placed evenly around the foot insulates against the cold and prevents perspiration. When traveling, we carried small twists of spare hay, and if the moccasin stuffing became damp or packed, thus losing insulating value, we halted, removed our footgear, and changed to fresh hay. Being a tenderfoot, I frequently found it expedient, when traveling by reindeer across the fjelds in bitter weather, to wear two pairs of moccasins, one over the other, with hay stuffed between them. Thus my feet were snug and warm in a forty-below-zero temperature. Of course my feet were larger than an elephant's, but no one in the arctic makes a point of beauty. In greeting one another, Laplanders do not inquire politely about health but ask, "How are your feet?" If fresh, dry hay is needed, the host graciously provides it. Although every wife is expected to sew skin garments and footgear for her family, a maker of good moccasins is held in high esteem and her daughters are eagerly sought in marriage.

Next to warmth, the prime feature of the moccasin is traction, due to the cleverly constructed sole made of two pieces of fur usually taken from the forehead of the reindeer. The pieces are joined at the instep, and the short thick hair of one piece faces in the opposite direction from that of the other. Clad in moccasins like the Lapps, I found it easy to run or walk on the glassy surface of the lakes and rivers. When moccasins have been bound on the feet with woven bands spiraled about the ankles, making the hip-length fur leggings as one with the moccasins, the snow cannot possibly penetrate within. Laplanders appreciate the (*Continued on page 86*)



Whether built of sod, wood, or felt, the Lapp's house, or kåta, *maintains its typical shape. The sod house at the left, within the Arctic Circle, is but one remove from the Eskimo igloo. At the right are "wooden tents" housing a nomad school in arctic Sweden.*

Rolling Off a Log

Plywood, Now Made Available for Many New Applications by the Development of Synthetic Resin Adhesives, Is Demonstrating Values in Defense

By Thomas D. Perry

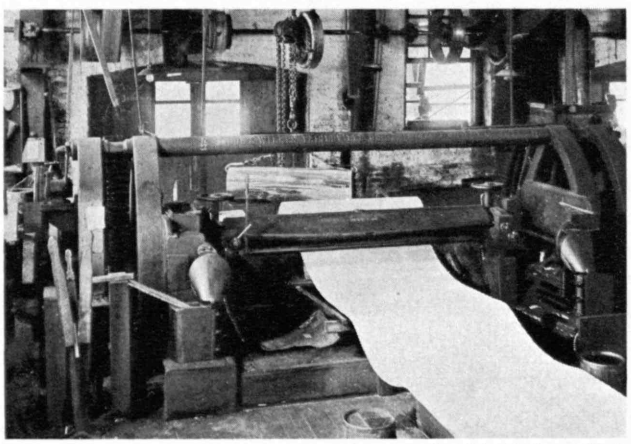
PLYWOOD, which consists essentially of layers of veneer bonded together with adhesives, is an ancient material that in very recent years has been freed from former limitations to an extent making it of pronounced value to defense activities as well as to normal peacetime uses. Limitations on the use of plywood have always been those of the available bonding agents and the technique of using them. Until the practical development of synthetic resin adhesives during the last ten years, many fields of possible application were barred to plywood by the inferior durability of conventional glues. Now, with dependable bonding agents, plywood not only is meeting what might be termed its logical uses but is being put to work in unexpected fields, where it can satisfactorily take the place of less generously available materials, such as the lighter metals.

Decorative veneers glued to a sturdy base, a forerunner of modern plywood construction, were used in Egypt as early as 1500 B.C. Examples of such artistic work occur from time to time through the succeeding centuries, culminating in the Bureau du Roi, the veneer masterpiece of all time, made for Louis XV between 1760 and 1770 and reputed to have cost him over a million francs.

The rudiments of modern plywood construction, i.e., with the grain of alternate layers at right angles, are first recognized between 1830 and 1840 in piano pin planks made of sawed veneer. The purpose of the cross layers was to insure a firm grip of the wood fibers on the shank of the tuning pin, so that after many years of twisting, the grip would still be firm and no signs of splitting would be manifest in the wood.

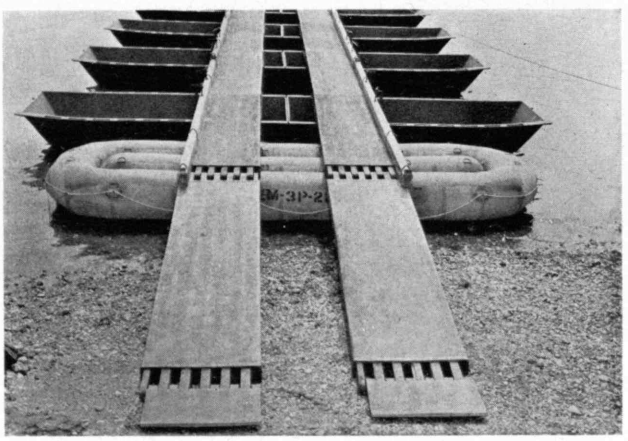
The making of cross-laid veneer products began to emerge as an industry early in the 1880's but grew rather slowly until about the beginning of World War I. The unusual ratios of strength to weight in plywood attracted the attention of the early aircraft engineers, who used plywood extensively in the primitive aircraft of that time. One of the handicaps to the new industry was the terms "veneer," "veneered," and "veneering," which suffered from somewhat sinister dictionary definitions. Manufacturers, trade associations, and government agencies joined in the search for a better name. The author well remembers the earnest discussions of those days, resulting in the choice of the term "plywood," which has since become the standard description of basic veneer assemblies. It had been an obscure technical term, little used and less understood, but has come to carry its new responsibility most efficiently. Plywood is a product made of veneer, as shoes are made of leather, as machines are constructed of iron and steel, as houses are built of wood and masonry, and as cloth is woven from thread and yarn.

Serviceable plywood requires a suitable quality of veneer and a dependable adhesive. The older conventional glues — animal, casein, vegetable, and soybean — had their good qualities and would render acceptable service under ordinary conditions. When subjected to



Grand Rapids Veneer Works

Rolling off a log as it looks in practice. This veneer lathe peels a continuous sheet of wood from the log by means of a long blade. Rotary production accounts for more than 90 per cent of veneer used. The practical lengths of rotary veneer seldom exceed twelve feet.

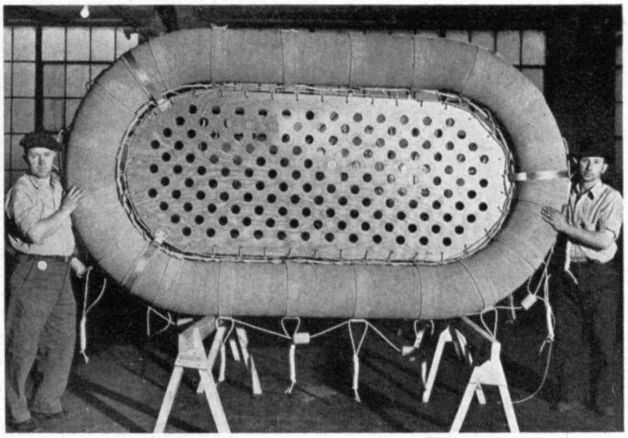


Courtesy Plyweld

One application of the ultimate product of the process of rolling off a log. This experimental plywood ramp, developed by the United States Army, will carry remarkable loads. The individual sections are quickly joined at their fingerlike ends with drive pins and are easily transported.

Courtesy Plyweld

An experimental towboat constructed of plywood for the United States Army. It has an overpowered engine and marked qualities of maneuverability. Special rails for handling the boat in and out of the water are shown.



Bristol Aircraft Corporation

Laminated lumber and plywood in a life raft. The ring is made of balsawood resin bonded, doweled, and tightly wound with canvas strips. The floor is of perforated plywood. Ten by five and a half feet, the raft accommodates twenty-five persons.

severe heat, moisture, and exposure to weather, however, none of them would withstand prolonged service, and, as a result, the use of plywood was restricted to moderately protected locations. Plywood made with the old glues was, of course, often blamed for failures that were caused by unintelligent adaptations.

During World War I, both cold-pressed casein and hot-pressed blood albumin were used in airplane construction, as they were then the best-known water-resistant glues. Both were of limited durability, were attacked by molds and fungi, and would deteriorate under severe exposure. The inadequacy of these glues, coupled with the vigorous promotional efforts of the rapidly developing aluminum industry, more or less sidetracked the use of plywood for aircraft. As a consequence, the airplanes of the succeeding twenty years were largely made of the lighter metals.

In the early 1930's resin adhesives were little more than interesting laboratory experiments, but of definite promise if their cost could be reduced. Around 1935 a phenol formaldehyde resin film, from domestic sources, became available at reasonable cost. It required curing, or hardening, under simultaneous heat and pressure, and the bond was irreversible, i.e., would not weaken or deteriorate from heat, moisture, or fungus; in durability, the bond would outlast the wood itself. It was soon recognized to be an adhesive with such service characteristics as to make plywood fully available for aircraft and boats. Supplementary to this resin film were a number of other resin adhesives, both urea and phenolic, with similar service qualities. The ureas were not quite so durable as the phenolics but could be cured even at room temperatures. The phenolics, which equaled the first film in durability, became available in liquid and dry forms for a wider range of applications.

These developments, by the end of 1938, had overcome the previous shortcomings of plywood, and resin adhesives began to re-establish plywood in the airplane program. The virtual standardization of the lighter metals in aircraft design at first retarded the adoption of plywood, but recent developments in plywood technique — such as high density, forming and shaping, flexible-bag pressure, and electrostatic heat-curing, which are to be described later — have tended to accelerate the incorporation of resin-bonded plywood into aircraft designs.

Veneer is the raw material, direct from the tree or log, from which plywood is assembled with a suitable adhesive. Over 90 per cent of the veneer used is rotary-cut on a lathe, much as paper is unrolled. The log is usually cooked in preparation for smooth cutting, and is rotated against a long knife that automatically advances into the log to regulate the desired thickness. Although the widths are unlimited, the practical lengths of rotary veneer seldom exceed twelve feet, and the majority are eight feet and less. Sliced veneer, cut similarly from the flat side of a log segment, may be as much as eighteen feet in length, but can be no wider than the log. Usual thicknesses are $\frac{1}{50}$ to $\frac{1}{4}$ inch, with limited amounts below and above that range. The cutting of rotary veneer gives much higher log yields than does sawing into lumber, as can be noted from the upper section of Fig. 1, page 74. The lower portion of this chart shows that the per capita use of lumber has declined during the last thirty-five years, while that of veneer has increased.

Many kinds of wood are cut into veneer, and the annual consumption of some of the principal species, as listed by the "Biennial Census of Manufactures" for 1939, is given below in board feet:

Softwoods		*Hardwoods*	
		Red (sweet) gum	222,162,000
		Tupelo (gum)	156,426,000
Douglas fir	382,817,000	Yellow poplar	59,071,000
Yellow pine	51,505,000	Cottonwood	52,738,000
Spruce	48,994,000	Birch	34,012,000
Ponderosa pine	36,193,000	Maple	33,187,000
Other species	23,995,000	Other species	92,879,000
Total	543,504,000	Total	650,475,000
Total, all species	1,193,979,000		

Veneer is used, of course, for many products other than plywood. Such articles as fruit and vegetable containers, hand baggage, and so on, are not segregated on the census records. The leading states in veneer production (1939) are Washington, Florida, North Carolina, Oregon, Mississippi, Georgia, South Carolina, Alabama, California, and Virginia, in that order.

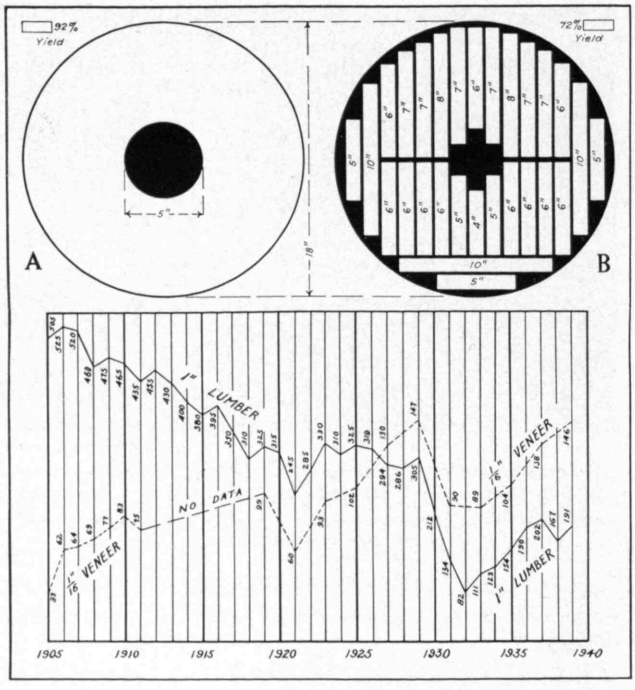


Fig. 1. Comparison of lumber and veneer. Above, log yield. Below, per capita consumption.

Since wood is strong lengthwise and weak widthwise, the crisscross structure of plywood, offsetting this widthwise weakness, imparts to the material substantially equal strengths in both directions. The original strength of the wood is reinforced by the adhesive, so that the aggregate strength of the integrated plywood is greater than the total strength of the veneers composing it. Plywood in its simplest form, three-ply, has two outer layers with parallel grain, each half the thickness of the center layer, or core, which has its grain at 90 degrees to that of the faces. The result is what is called a balanced construction.

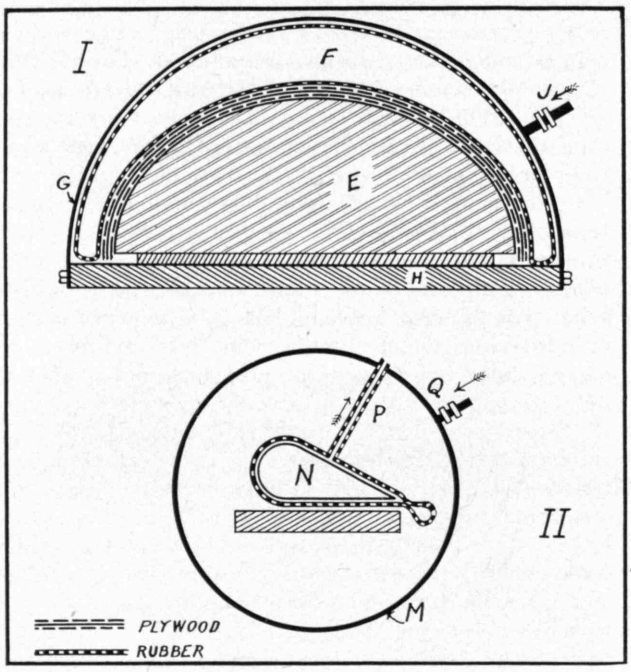
Another common construction is five-ply, in which the strength of the wood fiber may be equalized in each direction, or in which a thick lumber core may be used to give a dominant strength in the direction required. In the standard five-ply type, the cross layers between the core and faces are called "crossbands." Crossbands of $\frac{1}{16}$ inch will give adequate stability to plywood one inch thick.

Multi-ply constructions, seven, nine, eleven, thirteen, and so on, are often used when strength distribution and durability factors are important, as in aircraft and boats. An even number of plies is seldom used, as it results in an unbalanced construction and tends to cause warping and twisting. An exception is two-ply, which is often made for curved work, where the reinforcing of the double layer reduces the hazard of rupture of the veneer during bending. Two-ply is seldom an ultimate product but is, rather, an intermediate step toward the manufacture of a higher ply.

Laminated wood, a term used to describe a veneer construction in which all layers are parallel, is usually made in plywood factories. Its purpose is to maintain lengthwise strength and stiffness, which are sacrificed in standard plywood constructions. In fact, laminated wood is stronger than normal solid wood of the same dimensions, because of the overlapping of the slightly angling wood grain.

Generally, the thinner the veneer layers, the stronger the plywood or laminated wood. Veneer can be cut as thin as $\frac{1}{100}$ inch, but economic considerations prevent the extensive use of veneer thinner than $\frac{1}{40}$ inch.

The applications of plywood to be discussed later rely upon qualities peculiar to the material, which may be summarized thus: The strength of plywood may be distributed equally in both directions, whereas normal wood has a predominant strength in one direction only. Plywood cannot be split, because of the holding power of its adjacent layers. The shrinking and swelling of plywood, under exposure to moisture, are relatively slight. Wood does not shrink appreciably endwise, and the widthwise veneer is held to stable dimensions by the immediately adjacent endwise layers. This factor reduces warping far below that of normal solid wood. After gluing, plywood can be bent and curved to a much greater extent than normal wood, because of the reinforcing effect of the neighboring layers. The limber veneer layers can also be bent during bonding, when they easily slip by each other but are sturdily held in the curved position by the adhesive. The strength-to-weight ratios of plywood are exceptionally good, especially for aircraft and watercraft. Its relation of stiffness to weight is very useful, as is shown by the following table of the relative thickness of various materials in square-foot sheets weighing one pound: (*Continued on page 88*)



Institute of the Aeronautical Science

Fig. 2. All-directional pressure for bonding plywood structures is secured by the flexible-bag method. I. Bag F *is* inflated *through* J *and restrained by shell* G, *attached to base* H. *Mold* E (*metal or wood*) *is recessed for frame members; veneers thus are bonded into plywood and plywood is attached to frame in one pressure application. II. Bag encloses aileron* N, *temporarily fastened together. Bag is* deflated *through* P, *which remains as a vent. Tank* M *is filled through* Q, *imposing external pressure through the bag on the aileron. Several assemblies may be in one bag, or several bags in a single tank.*

The Nature of Money

The Dollar Is Subjected to an Out-of-the-Ordinary Examination

By William A. Rhodes

Popular Opinion or No, Action toward Making More Money Is Found to Be a Social Good

SUPPOSE we examine money in a manner a little out of the ordinary: in a direct and simple way. We may come upon something new. The monetary unit of the United States is the dollar. Let us accept that as our definition of money — in the United States, money is dollars.

In general there are two forms of money: bank accounts and currency. I may have ten dollars in my account at the bank, or I may have a ten-dollar bill in my pocket. Both are money. Both are dollars. Each form is convertible into the other. Neither has intrinsic worth. Both are mere combinations of paper and ink. And in the United States, the metallic coins used as the small change of currency are of such little value in metal that they too might as well consist of paper and ink except for wear and convenience.

The transfer of money from bank account to bank account is made by checks and deposit slips written in dollars. The transfer of money in currency is made by actual passage from hand to hand. Conversion of currency to bank account is made by deposit slip; conversion of bank account to currency is made by check.

In this country there are more than sixty billion dollars in bank accounts; something on the order of five hundred billions of dollars are written in checks each year; the lesser variety of money, currency, comes to a total of ten billions in paper money and in coins; and figure for the yearly transfer of currency from hand to hand is astronomical.

At the expense of bank accounts, currency is manufactured and issued as required. If fewer transactions were carried on by check, currency would be greater and bank accounts smaller, and vice versa.

But let us see how money as a whole is issued; how new dollars in both forms, bank accounts and currency, are placed in the possession of people for use.

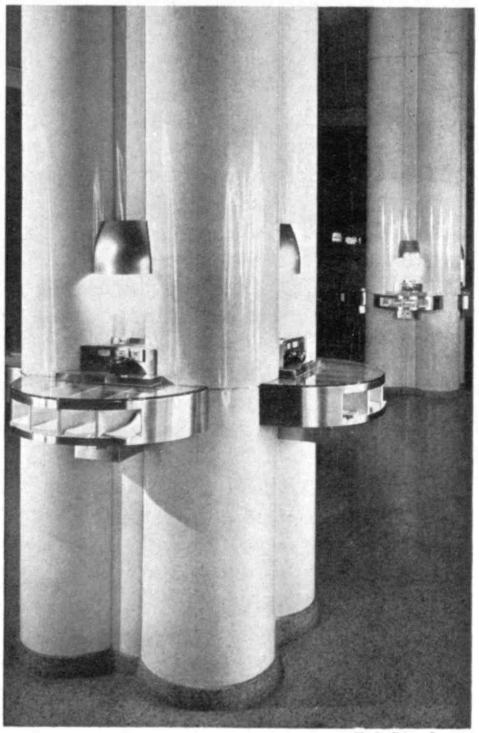
Two methods of issuing money exist. The first is the less important — the United States Treasury's purchase of gold and silver. Dollars are paid for these metals, dollars as we have defined them. And these dollars are new money because the Treasury, which pays money from its bank account (practically always by check), restores its account to the original amount by the deposit of gold and silver certificates.

The second method, the issuance of money by loan from the banks to business, is the more important because more money is issued thereby. We may broadly define business as human activity paid for in money. Under this definition come farms, mines, and factories; rail, trucking, and steamship companies and utilities; wholesale and retail firms and insurance companies; and local, state, and Federal governments. All of these businesses represent human activity paid for in money. All of them have bank accounts into which go loans and receipts — receipts either from the sale of goods or services, or, in the case of governments, from taxes; and out of these bank accounts expenses are paid for work done or material bought or interest incurred; and out of these accounts loans are paid off as required.

The banks, as we have said, loan money to business — the money consisting of intrinsically valueless paper and ink in bank accounts and currency, and of practically valueless metal in coins.

Secondary loans are made as well: I may loan part of my salary to you, or I may buy a government bond or a corporation bond with part of my salary and so loan money to the government or the corporation. But no new money is issued in either transaction. New money is issued by loans from banks.

Now each of these bank loans, by mortgage, bond, commercial paper, or what not, is scrutinized by the lending bank. Questions involving collateral, reputation and standing, the borrower's business ability, and the ultimate use of the loan are investigated in some degree,



In a modern banking house

F. S. Lincoln, '22

and usually in minute detail, by the lending bank. Loaning and investigation thus constitute the bankers' work. It is not easy work. It is work which is of great value to the community and profitable to the banker if well done and of very little value to either if poorly done. The work is paid for by interest on loans. The nature of interest need not be a mystery. Interest is merely payment for the work of the lender of money. And on a class of loans where interest is high, the excess interest may also offset the few uncollectable loans.

The soundness of the dollar depends almost wholly upon the soundness of the bankers' work. If a wave of fallacy should sweep the country (for instance, regarding the value of tulips, as swept Holland in days gone by), or if the country should suffer defeat in war, and money should be loaned to business tragically unsound, then true inflation would occur, and postage stamps sell for a thousand dollars apiece. Further loans, made to rescue those already out, would be still worse than the originals. Values in dollars would be anyone's guess. Money in circulation would pyramid.

Soundness of the dollar does not depend upon the amount of business being done. Business may decline rapidly and loans may be called, yet the dollar might remain the dollar, as sound and as desirable as ever, if not more so. Soundness does not depend upon the amount of business being done. But the *quantity* of money in use, in bank accounts and in currency, *does* depend upon the amount of business being done. The more business there is going on in the country, the more money is loaned; the less business, the more loans are called and the less money is loaned.

If business in the country ceased — as has at times seemed threatening — if people stopped all activities for which they are paid in money, all loans would be called and all loaned money would disappear. Banks' ledgers would show figures authorizing loans — potential money, but not money in circulation — for the bank accounts of business and for people: figures accounting for income, payment for work, and purchase of goods. Loaned money would disappear. No one would get it. And the only money remaining would be the comparatively small amount not on loan, the money paid by the United States for its stock of silver and of gold.

On the other hand, if Utopia were attained and, because of sound business, the average income for families in the United States were to rise to the giddy heights of $5,000 a year (a total yearly income of one hundred and fifty billion in place of the present ninety billion), then the total amount of dollars in use would expand. The total of loans would be far higher than it has ever been before. But the dollar would be the same. Where would the money come from? It would be created by being loaned.

From these considerations a quality may be observed which distinguishes money most clearly from tangible goods: Money is not limited in total amount. It is no more limited and no more a definite quantity to be divided than are misery or happiness, sickness or health. All are intangibles.

There is still another quality to be observed: Issuance of money follows the devising of business sound enough to convince the banks of the safety of loans and of the probability of adequate income from the business being carried on. The issuance of money by loan almost invariably does not precede, but follows, sound business.

Of course, a banker may step out of character, concoct a new venture or the modification of an old one, propose it to a business firm, and lend the firm money to proceed with the work. Opportunity exists, too, for a bank to loan money on an actuarial basis to many small firms, though the bank knows full well that a few firms will fail and that it must allow for such failure in computing the interest to be charged.

Although instances may be imagined and action may be taken where banking considerations come before business improvement, such cases are a secondary matter. In general, the situation is reversed. It is the business firm which devises the new sound business, asks for a loan, gets it, and thereby causes new money to be issued and business to be improved. It is the business firm, not the bank, which is in the best position, by virtue of its own special business knowledge, to devise the new sound business.

In a business depression, or at any other time, business itself must be built up by the introduction of new business. How? By sales in new territories, by variation in products, by better adaptation of work to the worker, by increase in range of qualities and prices, by the creation of new desires, by the exercise of all the originality and commercial inventiveness of the competent entrepreneur, by the further use of communication and transportation facilities. (A book could be written on the one subject alone of the value of transporting parts for assembly to areas where hand labor is willing and cheap and of transporting assembled goods back to rich markets for sale; and another book could be written on the value of that type of hand labor in armament production in the places where such labor now lives.)

Regarding debt as an evil under all circumstances is a delusion. Suppose all loans were paid off. Then indeed would trade and commerce and business, including government, operate under even more severe handicaps than are current today.

Then indeed would the point of view and the advice of the banker be lost, the restraint which he exercises against visionary and impractical business ventures be lost as well, and the conduct of sound business be further handicapped.

Let us recognize money for what it is. It is not a commodity, not limited. It waxes and it wanes in amount with business, including the business of government. It is a method, really; a method of accounting. And knowing this fact, we may each know better how to direct our own actions.

Another man or another firm may possess much money. We may envy them. But we need not take their money from them. We may proceed to make money of our own by more careful adjustments within our own affairs of business or by further business venture or by both, and we may proceed to make as much money as they without disturbing them at all. We may even both prosper to the gain of all others. As a matter of fact, that situation is general, because whatever we sell is more valuable to the buyer than it is to us, or there would be no transaction. (*Concluded on page 92*)

Flying Squadrons

The Mission and Make-up of the United States Army Air Forces

By S. Paul Johnston

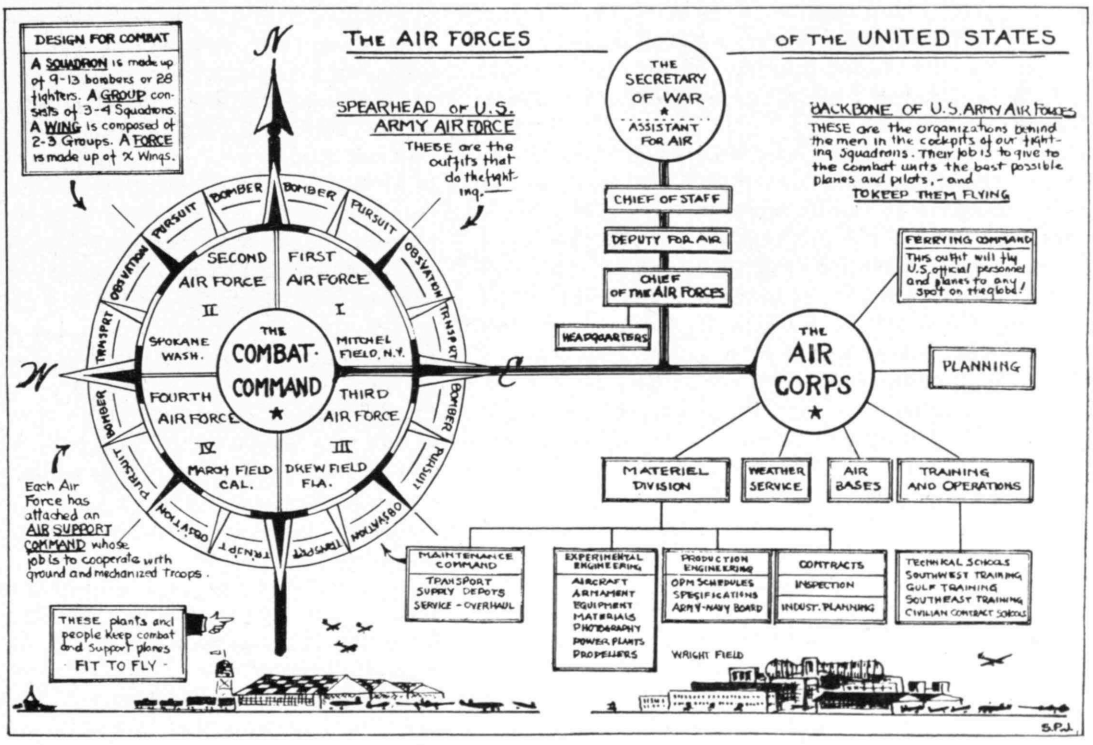
AIR power alone cannot win wars.* All arguments of syndicated experts and other columnists to the contrary, aircraft alone cannot take and hold disputed territory or subjugate determined peoples. But the airplane *is* changing the course of history, as did gunpowder and the ironclad. The airplane is a new weapon the use of which we are just beginning to explore. Its speed and range and load-carrying abilities make it probably the most effective instrument for warfare ever devised. It provides "eyes" to scan thousands of miles of enemy territory. It extends the range of the heaviest artillery a hundredfold. But it must be looked upon only as another weapon, an adjunct to armies and navies, not as a be-all or end-all. Because it is new and dramatic and terrible, too many people today are confusing air power with total military strength.

Germany, in rearming for her final effort at world domination, never made that mistake. Her military leaders were never carried away completely by Douhet's theory that an enemy can be brought to its knees by pressure of air attack alone. The Nazi war machine was planned as an integrated whole, with sea, land, and air power in their most effective proportions.

* All opinions expressed in this article are those of the author and in no way reflect the attitude of any government service or agency.

Not for nothing did groups of picked officers of the German General Staff spend two years successively with the tanks, the infantry, the air force, and even with the navy. When the time for action came, they knew how to use each weapon to its fullest advantage. When Stukas were needed, Stukas were there. When paratroop transports were needed, they were ready and waiting. So with artillery or tanks, and so with infantry. The old adage "get there fustest with the mostest men" may have won battles in the Civil War. Today, victory goes to the commander who gets in first with the proper *tools*, whether the tools be planes, tanks, or battleships.

Here is a simple lesson that we in the United States have had to learn. In our military thinking, as in most other aspects of our national life, we have been too fond of competition, too prone to let personal interests get in the way of co-operative effort. Rivalry on the football field between Army and Navy is normal and healthful, but to extend that rivalry into the realm of national defense may be fatal. The dusty-eared infantry may brag in song that it can "lick its weight in wildcats," including the "artillery, the cavalry, and the goddamned engineers," but when it comes to actual warfare, anything short of the all-for-one and one-for-all attitude is disastrous. France was lost as much by lack of co-ordination and planning as by shortages of men or matériel.



How the Army's air forces are equipped and organized for their varied tasks

Regardless of how this or that branch of the service is organized, defense depends on complete co-ordination of all branches — on land, on sea, and in the air.

Strangely enough, the country that had been stripped of its military aviation after the last War was the country that pointed the way to the modern use of the military airplane. What had first appeared to be a method of ensuring against a repetition of the events of 1914 boomeranged to give Germany an advantage not enjoyed by any other of the major powers. The Treaty of Versailles prohibited design, building, and use of powered aircraft in Germany. For fifteen years following the War, her air forces were nonexistent. This cessation of activities permitted Germany's air-minded groups to sit back without the pressure of continual competitive building and to study new manufacturing methods, new machines, and new tactics. In 1936, when Hitler dropped the curtain that had been concealing the activities of the preceding five years, he showed to the world a new air force built and maintained by new methods and intended for new usages — an organization that had started afresh and was unhampered by tradition. Furthermore, the German Air Force was an organization completely integrated with the other branches of the fighting services.

For three years the aeronautic and military experts of other countries looked on, but for reasons that now seem inexplicable they refused to be impressed. At most, they admitted and gave grudging admiration to the magnitude of the effort but mistakenly considered Goering's demonstrations and assertions as a form of Nazi exhibitionism. They apparently gave little serious thought to the uses to which German air power was intended to be put. We in America suffered from the same inertia. We were fully aware of what was going on in Germany. Our military attachés and a dozen civil and military observers had visited Germany and reported at length on the quantity and quality of her aerial preparation. Yet an actual declaration of war and a full year of operation in the field were necessary before we became sufficiently convinced of the danger to do something about it.

The turning point for United States military aviation came on the afternoon of May 16, 1940, when President Roosevelt spoke to the Congress of the United States concerning the defenses of America and mentioned for the first time an air force of fifty thousand planes.

That was really a jolt. At that time the total number of planes which could be mustered by the Army and the Navy together fell short of three thousand. That year our production of military and commercial planes was about the same number. No airplane manufacturer in the United States had ever received an order for more than two hundred of any particular size and shape of military plane. Generally speaking, orders ran in units of thirteen (one squadron plus one spare), and total numbers seldom exceeded fifty-two of any model. Actually, no more than a few of any particular order were likely to be identical, because changes in fitting-out or installation were made frequently. This policy, of course, tended to keep our service equipment up to date with new developments, but it was not conducive to anything like mass production. Our policy has been to make continual improvements in small lots of airplanes to keep obsolescence at a minimum. The theory has always been that if, as, and when an emergency came to pass, we could then "freeze" on the latest models for mass production.

There has been some sound reason for the maintenance of such a policy. During the last twenty years, we have been a nation at peace. We have had the protection of two broad oceans. Although we have been keeping up some semblance of a military and naval organization, we have had no idea as to how our military forces might eventually be used. We have had no clear concept as to who our potential enemies might be. No one could say whether the theater of future war would again be Europe, or Asia, or the Western Hemisphere. The matter of location is a pertinent one with respect to our air forces because the type of aircraft to be employed will vary considerably with the locale of operation. If we are to fight again in Europe, we shall need planes of a different type and in numbers of a wholly different magnitude from what is required if we are to concern ourselves only with hemisphere defense. In Europe, where distances between fronts are likely to be short, speed, maneuverability, and fire power are more important than range and carrying capacity. On the other hand, if we are concerning ourselves with hemisphere defense, long-range heavy bombers in great quantities will probably head the procurement lists.

The availability of adequate airdromes from which the fighting squadrons may operate must also be taken into account. Airdrome facilities have a distinct bearing on the types of aircraft to be procured. For example, today the trend is toward the improvement of performance by increase in the wing loading, which means boosting the number of pounds of total load that are supported by each square foot of wing area. Highly loaded ships are very fast, and in spite of all that we know about landing flaps, slotted wings, and other lift-increasing devices, these heavy planes must be landed and taken off at very high speeds. They require very large airports from which to operate. In the past, a load of twenty-five to thirty pounds a square foot was considered high and about the limit for operation out of ordinary airdromes. Ships of such loadings might land at seventy or eighty miles an hour, a speed that is quite common and quite safe under a wide range of circumstances. On the other hand, modern designs are calling for loadings in the neighborhood of sixty pounds a square foot or higher, with take-off and landing speeds of well over one hundred miles an hour. Such airplanes require large and carefully prepared fields in which to operate. We might easily fight a war with such machines if we could operate them from our system of large commercial airports, but there might be considerable question over operating from airdromes of the average size in England or in France.

Fighter types also depend upon the use for which they are intended. The British, for example, have concentrated in recent years on the interceptor — a single-seater, single-engine plane with high rates of climb, capable of getting upstairs in a very few minutes to head off high-flying bombers. Such interceptors, by their very nature, have sacrificed range and endurance for speed and climb. They are therefore of (*Continued on page 92*)

Research or Else—

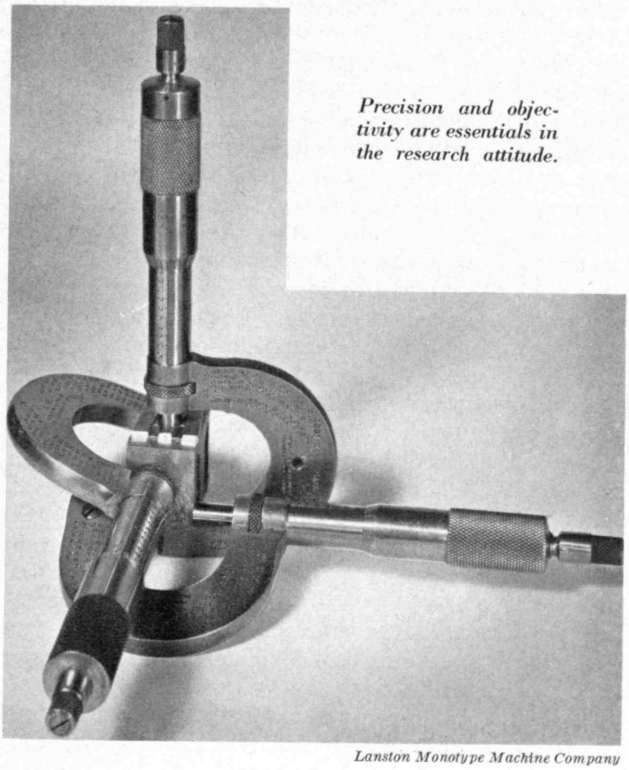
In the Regenerative Force of the Scientific Attitude Is the Unique and Hopeful Mark of Our Civilization

By Paul Cohen

ANY list of the eternal verities always includes some statement to the effect that it's a tough world — you can't be sure of anything — things certainly do change fast. . . . Such was the situation when glaciers were inching across Europe to the considerable discomfort of the local cave men, and such is certainly the situation today, sometimes modestly described as the most turbulent period in history. As far back as we know, the more articulate of our ancestors have been dropping bons mots which aver that about all that men can expect of this life is a condition of dynamic equilibrium, an existence somewhat comparable to that of a lumberjack on a rolling log.

Whereas a certain note of resignation could be detected in the attitude of the ancients toward the uncertain nature of man's poor lot, the entrance of science as a vigorous segment of our culture has tended to produce a more cheerful point of view. The anthropologists are pleased to point out that the conditions of rapid change under which mammoths and cave bears perished were just what the doctor ordered as far as man was concerned, since man's outstanding equipment in the battle for life was an unparalleled ability to shift his habits in an environment which would not stay put. As has been ironically apparent for some ten thousand years, the evolutionary success of this ability has been so great that, barring unforeseen natural cataclysms, the most serious remaining threat to man's existence is man.

Just to make the situation more confusing, every addition that men make to their culture broadens the base from which changes may spring and likewise intensifies the stimuli which prod men to invent new religions, social systems, and machines. The statistics which have been kept on inventors, for example, show that, on the average, a Connecticut Yankee living in a valley crammed with factories and machines is far more apt to obtain a patent than is a Kentucky hillbilly, although the psychologists stridently declare that no innate differences in mechanical ability can be detected between the two strains of Americans. No differences are necessary, for inventions arise out of the environment, each inventor standing on the shoulders of his predecessors. De Forest did not and could not invent the triode vacuum tube until Fleming had invented the diode, and Fleming could not have invented the diode without Faraday, Maxwell, Edison, Hertz, and many others to break the trail.



Precision and objectivity are essentials in the research attitude.

Lanston Monotype Machine Company

Up to a very short time ago the forces that arose when man, with his extraordinary ratio of brain weight to body weight, reacted on an increasingly artificial environment had seemed quite beyond control in their larger manifestations. Social, artistic, and technical changes, their effects accumulating like the interest on a World War debt, have resulted at times in veritable explosions of progress, as in the golden ages of the classic world or in our own industrial era. These same forces have led at other times to a cycle of strife and degeneration that ended in the decline of an epoch. In either situation, although many contemporary minds sensed these trends, the tendency was to dismiss them as destiny. And destiny, by definition, was inevitable, irresistible, inexorable.

To say that research has rendered destiny null and void would be slightly optimistic. But we should be failing to give research its due if we refused to admit that it promises to be the most effective rudder for civilization so far placed in the hands of man. Historically, the world has progressed like Topsy, waiting until the prophet was struck by revelation, the politician by ambition, the scientist by inspiration, and the inventor, as far as his neighbors could make out, by a blunt, heavy instrument while he was young. Still fresh in the memory of members of one organization is a line of offices libelously known as "Bughouse Row," in which the company's inventors worked. The danger now is to imply that the

coming of large-scale research has changed all these things and that progress may now be placed in the hands of a suitably appointed commissariat.

Nevertheless, the fact remains that, under proper and not too difficultly achieved conditions, research will frequently (but not positively) produce new machines and processes to order. For example, some administrator or entrepreneur with vision but with little engineering background may decide that a synthetic source for this or that chemical must be obtained, and will turn the problem over to the technicians, knowing that he has a fairly good chance of getting what he wants. To a Venetian doge, such a procedure was virtually beyond imagination. So would have been an analysis of laboriously acquired data to find, for example, how fast a population was growing and what its numbers would be twenty years in the future; how long it would be before the soil was stripped from a hillside; or when the rains would come. A prediction by itself would not have startled the Venetian, for soothsayers, astrologers, and their assorted kin are as old as is man's interest in the future. The novelty rests in the planned, clear-eyed search of the natural world that precedes the prediction and in the knowledge that the specific, unambiguous terms of the prediction will probably be fulfilled. In that knowledge, perhaps, lies the greatest promise of research, for more potent than its creation of material benefits is its ability to penetrate for some slight distance into the fog of the future and thereby to permit intelligent planning.

The uniqueness of research, as opposed to individual investigation, does not lie particularly in its facilities. As in all scientific investigation, the mainstay of research is the experimental method, equally available to the random investigator and the endowed scientific body. The tools and instruments of research are those known to all at any given stage of technical advance, but research, backed by far greater resources than is usually true with an individual, can afford more of them and better ones. Like the German armies, whose weapons, although perhaps heavier and more numerous, are no different from their opponents', research scores its successes mainly on the basis of tactics and organization. Research is a conscious, organized, disciplined quest for new facts, boldly mentioned in the budget and recognized by society to be a respectable activity, like churchgoing or listening to chamber music.

As such, it is a procedure of extraordinarily recent origin. Aristotle did not know it. Bacon expounded it but did not live to see it practiced. As late as the middle Twenties of this century, Arthur D. Little, '85, and many of less mellifluous tongue were still finding that they had to wander up and down this land preaching the gospel of research to bankers, vice-presidents, purchasing agents, and other Philistines. Only about a year ago the General Electric Company celebrated with justified pomp the fortieth anniversary of its research laboratories. Forty years are indeed a hoary age for an industrial research laboratory.

The differences between the methods of research and those of individual investigation are essentially those between Aristotle's Organon and the "Encyclopædia Britannica," between a country store and Macy's. Perkin, who discovered the first aniline dye and later successfully manufactured it, had to raise the funds with which his business was developed. He had to design the manufacturing apparatus, supervise its construction, and run it. And then he had to convince textile manufacturers of the advantages of the dyes. Because he was an energetic genius and because his synthetic dyes were so novel a product that they were virtually without competitors, he mastered these widely differing problems, but he was the exception that emphasized the general inviolability of the rule.

To carry a complicated machine or process from conception to successful commercial exploitation requires too many skills, too much effort, and too much time to be found in one man's existence. Likewise in pure science, problems refuse to shape themselves to the abilities of individual men. Now that the simpler applications of physics and chemistry have largely been made, and the more obvious principles detected, further advances tend to call for group efforts. Research, therefore, specializes and organizes, making use of chemists, physicists, mechanical engineers, electrical engineers, economists, librarians, patent attorneys, and so on, as the occasion requires. By specialization, several competent but not outstanding men can often do what one genius cannot. Men are by far the most critical factor in research, taking roughly 60 per cent of the budget and furnishing most of the administrative problems. But research, although by its nature in need of all the creativeness it can obtain, is independent of the "one mind"; if necessary, it can function with uninspired but capable men and still offer far greater chances for success in an intelligently chosen field than do the unorganized efforts of individuals.

A recent government report states that probably only about 5 per cent of the research projects undertaken by governmental and private agencies is brought to a successful conclusion, the criterion for success being material results rather than knowledge gained. Nevertheless, that "successful" 5 per cent pays not only for itself but also for the 95 per cent of "unsuccessful" undertakings. Indeed, it is enough to show a handsome profit, the Bureau of Chemistry and Soils estimating that the returns on its research program are in the order of $100 for every dollar spent for both successful and "unsuccessful" projects. (A feature of research not always visible to the auditor is the filtrate of knowledge and experience that even failures leave.) Perhaps the clinching argument in the conversion of government and industry to research has been the tremendous economic returns that follow research which has been planned with reasonable intelligence and executed with courage. J. D. Bernal has calculated that one series of researches financed by the British Government returned 800 per cent a year on the money which was spent. The statement has been made that 50 per cent of all goods produced in 1940 were manufactured in industries which did not even exist fifty years ago. Regardless of whether these specific claims can be proved to the satisfaction of a certified accountant, the accomplishments of research are great enough to produce in most of us a feeling that here is the touchstone for a brave new world. In this day of aged, devitalized, or timid institutions, research has appeared as a bold and optimistic (*Continued on page 97*)

THE INSTITUTE GAZETTE

PREPARED IN COLLABORATION WITH THE TECHNOLOGY NEWS SERVICE

More Room for More Work

Chemical Engineering Building and New Laboratory Structure Augment Institute's Facilities for Teaching and Research

ADJUSTING to special needs imposed by its share in the nation's defense effort, Technology has accelerated its normal building program during the past six months. As a result, the land immediately back of the main educational building has been a scene of much busy action, one old structure has disappeared, and two new ones have risen. A laboratory building ultimately to house the Institute's Department of Chemical Engineering, erected at a cost of a half million dollars, is the chief addition. The second new unit is a flexible laboratory structure, part one story and part two stories in height, designed to relieve the congestion resulting from defense work in present buildings. Together, the two new buildings provide approximately 90,000 square feet of floor space.

The new chemical engineering laboratory, connected to the main plant by an extension of the first-floor corridor of Building 4, is 200 feet long and 125 feet wide and has two stories, providing large areas of skylight for effective natural lighting. Two laboratories two stories in height occupy the central portion of the basement floor of this building, permitting ample room for large-scale apparatus to be used in fuel studies and in chemical engineering instruction and research. Three industrial chemistry laboratories are in the basement, and two are on the first floor. Storerooms, shops, and service areas complete the basement setup. Thirty offices and thesis rooms, as well as four class and conference rooms, are ranged around the outside of the first floor. In offices and classrooms, able use was made by the architects, Coolidge and Carlson [Harry J. Carlson, '92], of new methods of treatment of wall spaces and general areas. As a consequence, the new building has individuality in appearance, yet, with its exterior finish of buff brick, blends well with others in the group to the rear of the main plant. For the time being, this building is in use by the Chemical Warfare Service; at the end of the emergency, the Department of Chemical Engineering will move into its new quarters.

Authorization of the construction of this addition to Technology's facilities was announced on April 15; the building was occupied early in November. Considerable change in the appearance of the Institute's back yard has resulted from the addition, which necessitated the shifting of parking areas. The second new building, authorization of which was announced in July, has meant even greater change from former conditions. World War I had led to the construction of a large frame building, which in after years, as Building 20, was familiar to hydraulicians and river engineers who worked there on the model of the Cape Cod Canal. World War II meant the removal of Building 20 to make way for the new laboratories which compose the second addition completed.

This second new building, which is located in the same range with the Sloan Laboratories for Aircraft and Automotive Engines, closely resembles the Sloan

From an upper floor of the main building, additions to the Institute's educational facilities loom large. Nearer the observer is the skylighted roof of the chemical engineering building, with the new general research structure discernible just beyond.

M.I.T. Photo

M.I.T. Photo

This winding stair, connecting galleries in the open central area of the new chemical engineering building, offers interesting photographic composition.

Building in outward appearance. It is to be connected with the new chemical engineering building by an elevated passageway. The two-story section has been designed to allow construction of four additional stories, and the one-story addition can be extended to the north until it reaches the full width of the two-story part. Another possible extension could take the form of a multiple-story section on the west end or immediately adjacent to the Sloan Laboratories. This second new building, too, is surfaced with buff face-brick, a smooth-textured exterior surfacing being used between and above the ranks of windows which are the building's most conspicuous exterior feature. Plans for this building, like those for the addition to the Sloan Laboratories dedicated in 1940, were drawn by Lawrence B. Anderson, '30, and Herbert L. Beckwith, '26, of the Institute's School of Architecture. The general contractor for this building, construction cost of which was about $260,000, was the Sawyer Construction Company of Boston [C. A. Sawyer, Jr., '02]. General contractors for the chemical engineering building were McCreery and Theriault [George W. McCreery, '19].

The Hangar Gym, now sandwiched between the buff and brick of Barbour Field House to the east and these two new structures to the west, remains on the Institute sky line — as our photographs show — as isolated reminder of Technology's share in defense nearly a quarter-century ago and of its need for an adequate gymnasium now.

Excellent Vu

AN addition to undergraduate publications is always interesting, though for one reason or another it does not always fall within the category of "blessed events." But the Institute's newest student publication, *Vu*, a quarterly pictorial magazine, is a lusty and well-bred infant, sponsored by *The Tech*. *Vu* has chosen for itself the worthy object of photographically documenting life at Technology.

"We will try," say its editors, "to present an informal and interesting record of 'Life at the Institute'; a pictorial record which in later years will strengthen nostalgic reminiscences of extra-curricular life and activities — a vital part of Technology life. But more than this, we hope to bring, in picture form, pertinent news of some of the many fields in which Institute students are interested."

A pictorial magazine fits logically into the field of undergraduate activities at Technology, where interest in photography is exceptionally widespread. In its first issue, *Vu* presents with excellent taste a well-balanced editorial fare which includes infrared photographs of the Institute's buildings; opening events of the school year, faculty as well as undergraduate; a striking group of high-speed photographs from the laboratory of Harold E. Edgerton, '27; athletics; and student social affairs. A special feature is a section devoted to Wellesley College.

Vu's first issue, which was sold out within a few hours after it appeared, brought much favorable comment from students and members of the Institute's staff.

The Council Meets

TRIBUTE was paid Jasper Whiting, '89, President of the Alumni Association in 1914, at the 222d meeting of the Alumni Council, held on the last Monday in October. Resolutions citing Mr. Whiting's wide experience as scientist, engineer, traveler, and writer were presented by a committee including Frederic H. Keyes, '93, chairman; Charles F. Park, '92; and Elbert G. Allen, '00.

An active participant in many of the affairs of the Institute, Mr. Whiting, whose death occurred last August, served as a term member of the Corporation from 1915 to 1920. As chairman of the committee appointed by the Alumni Council to consider the advisability of establishing at the Institute a Course in business engineering, Mr. Whiting rendered valuable service to the school. The report of his committee, adopted by the Council and approved by the Corporation, resulted in the establishment of Course XV. Mr. Whiting served in the World War as a captain with the Signal Corps and later as a major with the Chemical Warfare Service. In 1920 he was decorated with the Purple Heart by the United States War Department, being personally recommended by General John J. Pershing.

M.I.T. Photo

Framed between the new general research building at the left and the chemical engineering building at the right looms the Hangar Gym, gaunt reminder of an earlier period of national stress.

B. Edwin Hutchinson, '09, President of the Alumni Association, called for a minute of silent recognition of Mr. Whiting's services.

Discussion of the responsibilities and duties of the Council followed the formal business of the evening. Dr. Compton, asked for opinion on the matter, stressed the value of the co-operation existing between the Council and the Institute administration. Citing some of the important accomplishments of the Council in the past, he pointed out new opportunities in the present situation. Edward L. Moreland, '07, Dean of Engineering, the principal speaker of the evening, presented a detailed picture of recent developments at the Institute, describing additions to the plant, the inauguration of clinics in the Medical Department, the research being done under government auspices, the establishment of the Department of Meteorology, the inauguration of work in biological engineering, and other important innovations.

Latin-American Printing

THE Friends of the Library had on exhibition at the Institute a notable collection of Latin-American printing assembled by the division of intellectual co-operation of the Pan American Union and presented in this country by the American Institute of Graphic Arts. The exhibition represented a wide range of work in the graphic arts, including books, lithographs, etchings, woodcuts, steel engravings, and aquatints, as well as a number of striking political posters. One of the most interesting exhibits was a 1939 issue of the periodical *Mexican Art and Life* containing an account of the four hundredth anniversary of printing in Mexico.

The collection, the first of its kind brought to this country from South America, offered an unusual opportunity for a comparison of the graphic arts and culture of South America with our own. Notable among the exhibits were a number of exceptionally well-designed paper-bound books produced at low cost. These specimens should stimulate the imagination of publishers to investigate a field to which little attention has been given in this country.

Additions to the Staff

NEW members of the staff who have entered upon their duties this academic year include Bissell Alderman, '35, who has joined the faculty of the School of Architecture as assistant professor, and Frank S. Post, who has come to the Department of Military Science and Tactics as assistant professor.

M.I.T. Photo

The many skylights of the chemical engineering building in emphatic pattern

Appointed to the grade of instructor were Martin Deutsch, '37, Herman Feshbach, and Laszlo Tisza, Physics; Frederick A. Harris and Edward Woiccak, Military Science and Tactics; John M. Hartwell, Jr., Business and Engineering Administration; John Lowe, 3d, '37, Civil and Sanitary Engineering; Owen G. Owens, Mathematics; H. Rush Spedden, Metallurgy; John A. Doremus, '38, and Robert C. Seamans, Jr., Aeronautical Engineering; Raymond E. Keyes, '40, Naval Architecture and Marine Engineering; Rodney M. Baine, George W. Kuehn, Theodore Wood, Jr., and Charles B. Woods, English and History; and Robert M. Sherman, Jr., '36, Chemistry.

Walter J. Hamburger, '21, Frank J. O'Neil, '40, and Walter M. Scott have been appointed lecturers in textile research; and Vincent T. Giardino, '29, and Erwin O. Kruegel, '32, lecturers in textile technology. Raphael Salem is lecturer in the Department of Mathematics.

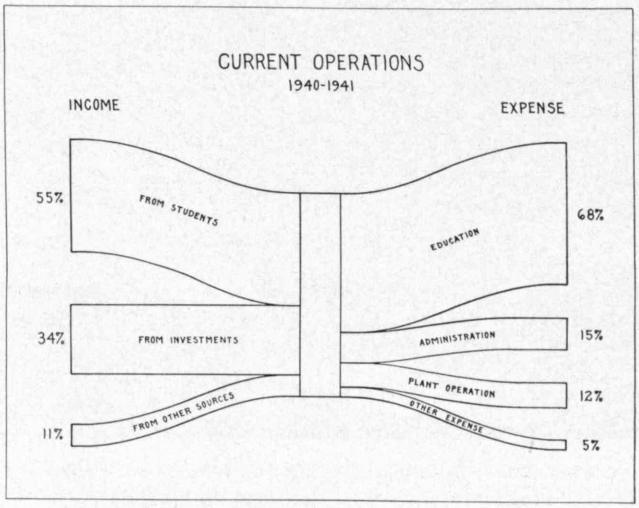
Douglass V. Brown, Associate Professor of Industrial Relations, who has been on leave of absence from the Institute's Department of Economics and Social Science as chief economist of the Office of Production Management in Washington, has at the request of the government been granted additional leave so that he may extend his stay in Russia, where he went as a member of the American delegation with W. Averell Harriman.

Fiscal 1941

DISCUSSING the financial affairs of Technology for the fiscal year ended June 30, 1941, as detailed to the Corporation in his annual report, Horace S. Ford, Treasurer of the Institute, found, among other things, basis for prediction concerning the Technology Loan Fund. During the coming year, the Loan Fund probably will completely "revolve," that is, will cover all loans from the cash receipts in the year and without draft on the invested funds. During the last fiscal year, loans amounted to $141,800; collections of principal and interest on past loans totaled $132,000. Only $9,000 of the cash assets of the Loan Fund, therefore, had to be drawn to provide for the loans granted during the year. In the year before, $48,000 had to be drawn from Fund assets for this purpose. Thus as the Loan Fund goes into its twelfth year of operation, the ideal of balancing outgo and income bids fair to be realized.

Other salient portions of the annual financial report show that of the total amount received from tuition — $1,813,000 — a greater proportion than for the year before came into the Institute, for scholarships granted — $200,000 — were $7,000 less than in fiscal 1940; and student loans made and applied to tuition — $121,000 — were $20,000 less than the comparable figure for the year before. Tuition payments totaled $4,000 more than in fiscal 1940. Capital gifts during the year amounted to $510,000. Considerable amounts from this source were applied to new building construction, to which an appropriation was also made from the Eastman Building Fund and from various unrestricted funds. Book value of the endowment and other funds decreased about $30,000 during the year, to a total of $35,982,000.

Budgeted expenses of the Institute for the year were about at the level of the year before. Total income exceeded expenses by some $50,000, so that no drafts were necessary on income equalization reserves or other similar funds. For the first time in many years, the Institute balance sheet showed substantial borrowings from endowment fund cash, both for current purposes and for plant construction. Extensive advances made for the various research projects of the National Defense Research Committee and other governmental agencies account for the first type of borrowing. Payments made toward the construction of the new chemical engineering laboratory building for occupancy by the Chemical Warfare Service led to the second. Advances on account of government research projects will be repaid on completion of the projects. Advances on the laboratory will be repaid over a term of years, if occupancy of the building by the Chemical Warfare Service continues. Otherwise any unpaid balance must be taken up by the Institute itself.



Flow chart of the Institute's financial operations

Investment income decreased $80,000 from that of the previous year, the drop being largely accounted for by the deliberate holding of a substantial amount of cash and by the substantial borrowings for the government research and construction already mentioned. The yield on all investments figured at market value was 4.36 per cent as against 4.32 per cent in fiscal 1940 and 3.89 per cent the year before.

Honoring Ellen H. Richards

ELLEN H. RICHARDS, '73, the first woman to enter the Institute and the first woman to be graduated from it, has been honored by the trustees of the Pennsylvania State College by the establishment of the Ellen H. Richards Institute, which is a consolidated research unit to study improvement of standards of living in the fields of food, clothing, and shelter. It is administered jointly by the school of agriculture and the school of chemistry and physics of the college.

The institute has been named for Mrs. Richards in recognition of her devotion of her professional life to the application of chemistry and the scientific method to improving home living conditions, and to establishing

household science as a field for study in the improvement of standards of living. Sketching Mrs. Richards' scientific career in an article in the *Journal of Home Economics*, Pauline Beery Mack, director of the newly founded institute, points out that: "Although Ellen H. Richards had no specific connection during her lifetime with the Commonwealth of Pennsylvania, her work transcended state lines and influenced progress in household science in this and other states. It is hoped by those instrumental in the establishment of the Ellen H. Richards Institute at the Pennsylvania State College that the Institute which bears the name of this pioneer chemist and household scientist will be of sufficiently broad interest in the lives of people in all socioeconomic levels throughout all parts of the country to be worthy of the woman whose namesake it is."

For Achievement in Journalism

GODFREY L. CABOT, '81, who in 1938 established the Maria Moors Cabot Prizes for annual award by Columbia University in recognition of achievement in journalism, has endowed these awards by a gift of $281,000. News of Dr. Cabot's generous gift, the income of which is to be used in perpetuity for "international friendship in the Western Hemisphere," came recently with the announcement of the winners of the Cabot awards for 1941, who, all distinguished journalists, are Paulo de Bettencourt, editor and publisher of *Correio da Manhã* of Rio de Janeiro, and his wife, Sylvia de Bettencourt, a distinguished columnist on her husband's newspaper; Carlos Dávila, editor of the Editors Press Service of Chile; and José I. Rivero, editor and publisher of *Diario de la Marina* of Havana.

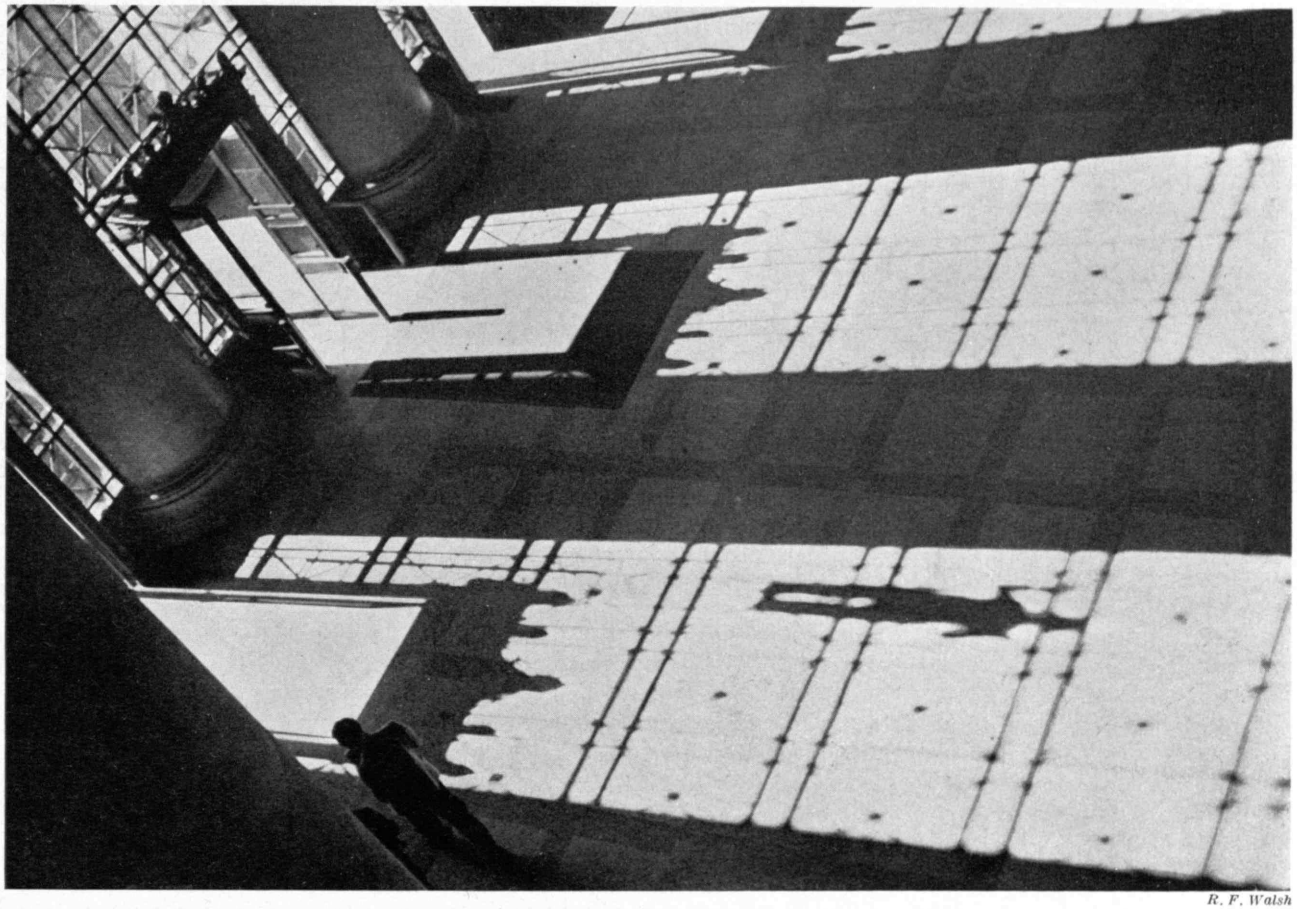
Commenting upon the endowment of the Maria Moors Cabot Prizes, Carl W. Ackerman, dean of Columbia University's graduate school of journalism, noted that Dr. Cabot's gift is the first endowment of an educational project limited to and including the whole of the Western Hemisphere and the first international prize plan in the field of journalism. Its purpose is to encourage and to recognize the services of the press in public education.

Electronic Instruction

METHODS of instruction in the application of high-frequency radio-wave techniques in the Army and in national defense industries were discussed by representatives from the faculties of forty leading educational institutions at a conference at the Institute in November.

The meeting was a preliminary step to the establishment as soon as possible of a nation-wide program of co-ordinated courses to meet the urgent need for engineers and scientists with fundamental training in electronic and high-frequency techniques.

Sponsored by the engineering, science, and management defense training division of the United States Office of Education, the program (*Concluded on page 102*)



R. F. Walsh

In shadow on the floor of the Rogers Lobby, an unseen window washer works.

NECESSITY'S ARCTIC CHILDREN

(*Continued from page 71*)

insulating value of air space. They know that warm clothing is loose clothing. The dress of both sexes consists of a loose, belted tunic worn over woolen trousers which fit beneath hip-length fur leggings. Finnish Lappmen are distinguished by their "four-winds" hats, which are stuffed with eider down. The Swedish Lappman wears a wonderful visored dunce-cap of blue wool with giant red pompon atop it. When slanted in the direction from which the icy winds blow, the pompon prevents the head from freezing. Fur driving-mittens stuffed with hay are used for travel. A reindeer-skin *paesk* (fur parka) is the garment of the arctic. Either short or long, it is worn by men, women, and children alike. In an emergency the long *paesk* worn by a herder may serve as a sleeping bag. If the man is caught out and has to remain on the snow with the herd during a blizzard, he simply lies down, pulls his head in, and draws his feet up.

Recently four adventurous Finnish soldiers, clad in white deerskin *paesks* and white moccasins, without sleeping equipment or food, went on ski into enemy territory. By traveling light, living on the land, they made a successful two weeks' foray in a forty-below-zero temperature to cut the enemy's arctic rail line to Murmansk.

Lapp ski constructed of light birch have a certain amount of traction without retarding speed. Tacked along the bottom of the runner of each ski is a strip of reindeer hide about three feet long and three inches wide, with the grain of the hair slanting backward. A simple loop of rawhide serves admirably instead of binders. When hunting, a nomad must be able to get on and off ski easily. He kneels in the snow to take aim at a bear, for instance. If he misses, his life may depend upon his being able to leap upon his ski and be off without a moment's delay.

His pulka is noteworthy for shrewdness of design and for balance. It looks like a cross between the front half of a gondola and an ice skate. With this boatlike sled, built upon a single runner, Laplanders are able to travel the rough fjelds and roadless country lying 1,500 miles nearer the North Pole than Hudson's Bay in Canada. A pulka is usually six feet long and six inches deep. The efficient length is six feet because it permits the driver to sit with legs stretched and still have room for a small knapsack in the prow. A longer pulka is not so versatile; a shorter one is awkward to manage. The front end is shaped to a point similar to that of the prow of a gondola. The sides and bottom are fitted together on a rib structure like that of a canoe, and form an oval surface. A low runner, one-half inch high and three inches wide, extends the length of the center bottom, protruding a couple of inches beyond the back rest. The runner is usually covered with a strip of tin or iron.

Since the pulka is as tippable as a canoe, the rider must balance himself on the rough terrain by hanging one foot overboard and dragging it in the snow, toes bent backward. The reindeer is attached to the pulka by means of a single rawhide thong which passes beneath his belly and between his hind legs. Thus the animal has absolutely no responsibility toward the craft, which the driver must manipulate by a movement of his body, braking with a foot in the snow on downhill grades. A pulka can travel across country anywhere a reindeer can go, negotiating steep grades, deep snows, and trackless forests. Watertight, it can be floated in an emergency, though the reindeer can be used as motive power only on the snow. A half-dozen auger holes in either side of the rim of the prow of the pulka permit baggage to be laced in, thus preventing it from being lost with the first upset. Lapps have cleverly devised covered pulkas for use in transporting their valuables and small articles and foodstuffs.

Before the advent of the Lapland railway nearly thirty years ago, the only method of hauling iron ore from the now famous Kirunavara iron mine in Swedish Lapland to the Gulf of Bothnia, a distance of 200 miles, was by reindeer-drawn pulkas. Each animal can draw a load of 200 pounds twenty or twenty-five miles a day.

A Lapp drives by means of a single rein fastened at the base of the antlers of the reindeer. No halter or bridle is used. Although the loss of one's reindeer on a lonely fjeld is a matter of life and death, the rawhide rein has neither knot nor loop on the end. The trick of manipulating the rein is to place it along the forearm beginning at the wrist; then, starting at the elbow, spiral the rein back around the arm as far as the wrist. With the rein thus attached, the driver, if upset, is merely dragged along, the rein tightening about his forearm. In an emergency, however, he can let go with a flip of the wrist and twist of the arm.

En route in December to a reindeer roundup 250 miles north of the polar circle, we had to cross a broad river where the ice was weak over the deep section near the bank. Herders strengthened the ice during the night by pouring water on the surface, waiting for it to freeze, then adding more water, thus building up the thickness. The following morning we crossed safely.

Along the river I noticed several hollowed-out sections of small birch tacked in trees. Lapps place these birdhouses in the trees and later return and collect the eggs. To remove eggs from a nest belonging to someone else is unethical.

I was attracted by an ingenious foxtrap made from the tall stump of a tree slit in three V-shaped prongs with bait on top. When a fox leaps for the bait, he inadvertently hangs himself.

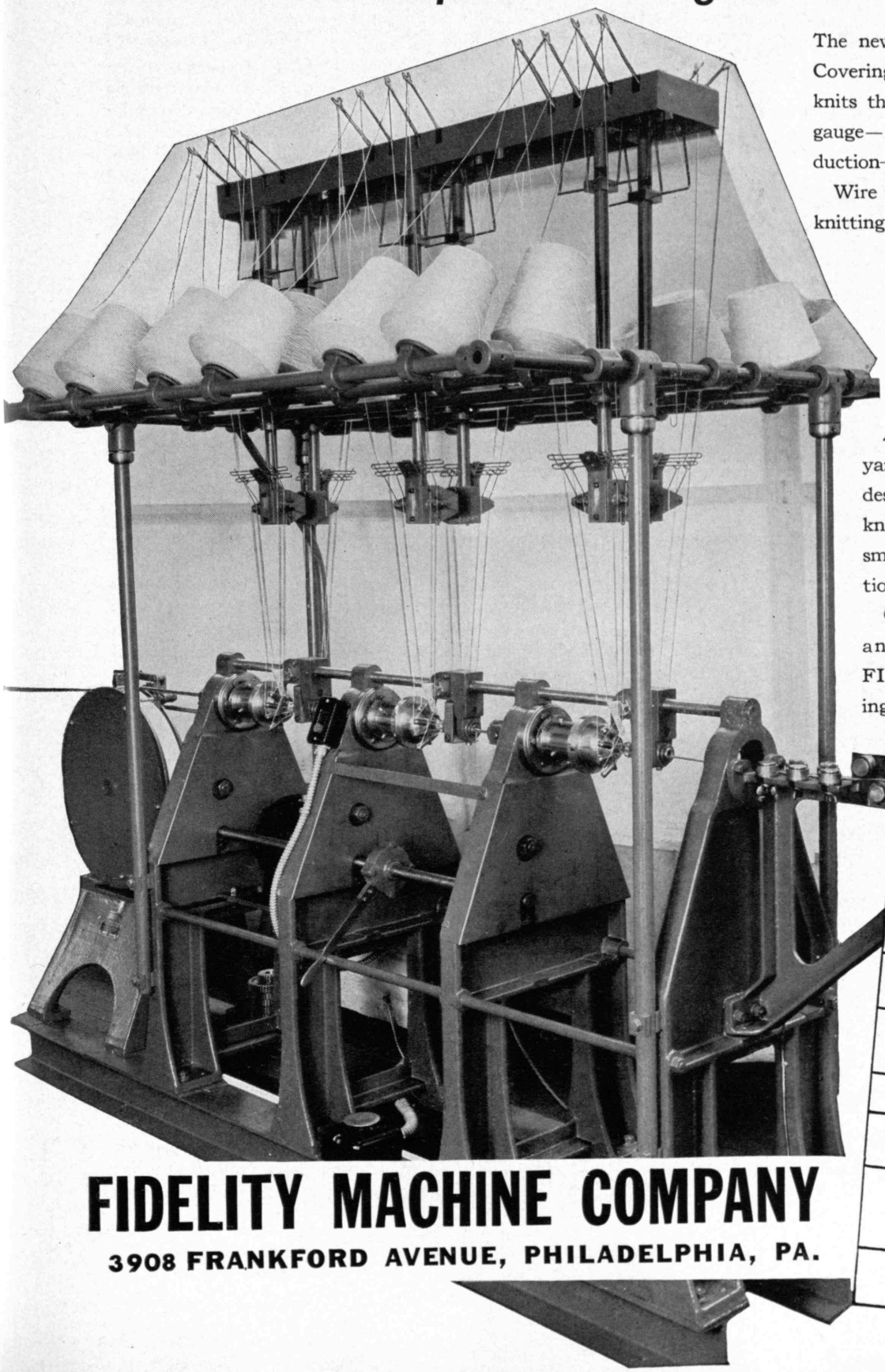
All unleashed dogs in one hamlet we passed wore blocks attached to their collars. The dragging of these "yokes" in the snow discourages the dogs from chasing young reindeer.

At the roundup, an annual affair when all reindeer in a given district are put through a corral and every family retrieves its own animals, each of the thousand fur-clad nomads assembled on the plateau near the forty-acre corral wore a lasso coiled about his or her shoulders. It is a forty-foot length of rope about as big around as the forefinger, and instead of a loop on the end, the Lapps use a bone with two holes in it. The rope is tied through one hole and slides freely through the other, forming a noose. During the course of two weeks, I watched the nomads, working in (*Concluded on page 88*)

Announcing

A *NEW* FIDELITY SINFRA TRIPLE-HEAD WIRE COVERING MACHINE . . .

for triple covering of wire



The new FIDELITY Sinfra Triple-Head Wire Covering Machine—three knitting heads in series knits three cotton coverings on wire up to #6 gauge—1200 to 1500 feet per hour—speeds production—low power consumption.

Wire fed over straightening rolls through three knitting heads in series—each head knits one covering. The covered wire then passes on to a 36″ capstan take-off. Separate haul-off reel stand—maximum 40″ O. D., 40″ traverse, 1000 lb. capacity—simplifies removal of finished product—saves floor space.

Automatic electric stop-motion for each yarn . . . improved knitting head and needle design eases removal and replacement . . . knitting direct from large cones eliminates small package winding . . . and quiet operation reduces operator fatigue.

Compact design, high rate of production and low power consumption make FIDELITY Sinfra Triple-Head Wire Covering Machines time- and cost-savers for you.

Write for Bulletin

SPECIFICATIONS FIDELITY Sinfra Triple-Head Wire Covering Machine	
No. Covers Knitted	3
Rate of Production	1200′—1500′ per hour
Size of Wire Covered	Up to #6 Gauge Bare Copper Wire
Power	1 H.P.
Floor Space (Knitting Unit)	12′ x 4′
Haul-off Reel Capacity	Max. 1000 lb. Max. 40″ O.D.— 40″ Traverse
Yarn	Knit Directly from Large Cones

FIDELITY MACHINE COMPANY

3908 FRANKFORD AVENUE, PHILADELPHIA, PA.

NECESSITY'S ARCTIC CHILDREN

(*Concluded from page 86*)

a thirty-five-below-zero temperature, lasso ten thousand reindeer. It was a magnificent spectacle — here a Lapp dragging a reindeer, there a reindeer dragging a Lapp, looming shapes, coated with hoarfrost, disappearing and emerging through the icy fog.

Arctic Lapland with its polar climate may appear unfriendly to the outsider, but to the nomad who understands it and adapts himself, using his native ingenuity in providing for his needs, the Land of Long Night is a comfortable home.

ROLLING OFF A LOG

(*Continued from page 74*)

Material	*Specific Gravity*	*Thickness*	*Per Cent Thicker than Steel*	*Per Cent Thicker than Aluminum*
Three-ply spruce plywood	.43	.447 inch	1800	630
Three-ply poplar plywood	.50	.384 "	1540	540
Three-ply birch plywood	.67	.287 "	1150	400
Multi-ply birch plywood*	1.35	.142 "	570	200
Aluminum	2.70	.0712 "	390	—
Steel	7.70	.0249 "	—	—

* High-density plywood, made of ⅛-inch birch at 1,500 pounds pressure.

CONSIDERATION has so far been given to normal plywood, in which wood compression is nominal and only enough to bring the veneer surfaces into close contact. If greater pressures (500 to 1,500 pounds and even higher) are exerted, the veneer is compressed into a high-density plywood with a larger amount of wood fiber per square inch of cross section and a proportionally greater increase in strength. If the veneer layers were originally $\frac{1}{30}$ inch thick and are compressed to $\frac{1}{45}$ inch with a resin adhesive between them, a substantial amount of resin impregnation occurs. A 50 per cent increase in material will double both tensile and shear strengths.

Several types of high-density plywood are made, depending on the ratio of wood fiber to resin, on the pressure exerted, and on the kind of resin used. A phenolic resin film can be employed to give a product which is essentially wood reinforced with resin, with wood characteristics predominating. The film process is simple, and the amount of resin can be controlled by the thickness of the veneer layers.

Another method for high-density work, which produces what is referred to as "impregnated wood," forces liquid phenolic resin into the voids of the wood fiber, and then, after reducing the solvent content by predrying to avoid blisters in hot-pressing, compresses the whole in a hot-press, as with the resin film. The result is a resin reinforced with wood fiber, in which resin characteristics dominate. The resin content is considerably higher (of the order of 30 to 10) than in the film product, and water absorptive capacity is less. Both products are affected far less by moisture than is normal wood or plywood. In general, the maximum specific gravity attainable is 1.30 to 1.40, and strengths vary closely with the specific gravity.

An interesting development of high-density plywood is that of variable-density construction. Here more layers of veneer are used at one end than at the other and the whole assembly is compressed to an even thickness, resulting in greater compression and higher density at one end.

The ability to predetermine density and strength gives to designers of plywood structures a facility that exists with few basic materials. While this procedure can be compared with the alloying and heat-treatment of metals, it has an even wider range of practical applications.

Plywood lends itself efficiently to forming and shaping. Attachment or connector clips made of plywood are easily bent and bonded between pairs of heated metal dies. These clips and braces can be made of normal or high-density plywood, depending on strength requirements. The use of them, with adhesives, in constructions involving plywood to plywood or plywood to frame members, reveals one of the marked advantages of plywood over the metals. Riveting, spot welding, or strip welding must be employed with metals, whereas the clips or braces used with plywood can be glued over their entire area and supplemented, if necessary, with mechanical fasteners to maintain pressure until the adhesive gets its initial grip. Rivets are costly, the installation of them is time consuming, and the irregularities of the resulting surface are most unfavorable in air or water currents. Glued plywood provides the smooth streamline surface, strongly attached to its framework, which is so essential in aircraft and boats. This forming and shaping can be done best in heated dies, using thermosetting resin adhesives.

One of the newer techniques in the plywood industry, although it has been used in rubber vulcanizing for years, is the flexible-bag method of applying pressure. A distinct advantage of this process is its quality of fluid, or all-directional, pressure — in other words, the pressure is perpendicular to all flat or curved surfaces within its range. This fluid pressure can be exerted in a number of ways, two of which are shown in Fig. 2, page 74. The fluid-pressure medium can be air, steam, hot water, or a combination of them, the chief problem being rapid application.

The assemblies on which the technique is usable can be of veneer or of two-ply, of such widths and shapes as will make tight-fitting joints without overlapping. In the half-fuselage shown in Fig. 2-I, the inner strips of veneer are longitudinal and tapered like barrel staves, the center layer is of moderately wide half hoops, and the outer layer is parallel to the inner layer. If a boat hull is to be made by this process, large two-ply sheets are customarily used, with V's, or gores, cut to permit proper curving or tapering of the layers. In the aileron shown in Fig. 2-II, the skin covering may be made of either veneer or plywood, often laid at an angle of 45 degrees to the axis of curvature and temporarily attached to the inner framework until the adhesive acquires its grip. These are only two relatively simple constructions using resin adhesives of the phenolic type; many others employ combinations of these processes and apply flexible pressure in other ways.

The flexible-bag process permits the making of shell or *monocoque* constructions of an infinite variety of shapes and range of complexity. The method may be compared to the drawing of metals between pairs of dies, but it has the distinct advantage of resulting (*Continued on page 90*)

ROLLING OFF A LOG

(*Continued from page 88*)

in a product that is more nearly free from internal stresses than is drawn metal. It is also true that plywood can be molded into many complex shapes which are beyond the practical range of drawn metal. Adequate strength data on these plywood shell constructions are urgently needed, as they are known to have phenomenally high ratios of strength to weight.

Well demonstrated is the fact that resin adhesives have definitely greater durability when cured with heat than when cured with chemical reagents. For plywood constructions up to an inch in thickness, the surface application of adequate heat is entirely practical. For assemblies several inches thick, other methods of heat application are imperative. The most satisfactory solution, so far, is to put the clamped plywood assembly in a high-frequency electric field of some five million alternations each second, provided by flat metal electrodes which are insulated from the metal parts of the press and are placed at the bottom and top of the assembly and within the press. The heat thus generated raises the temperature of the assembly within the field to the point necessary to polymerize the resins. The lines of resin adhesives are found to be some 20 degrees hotter than the adjacent wood, which is a favorable gradient that does not tend to dry the wood excessively. Other than this differential, the entire assembly in the field is heated instantly and the cure of the resin can be effective in a matter of minutes, depending on the intensity and capacity of the field. Whether this process will become economically available for thin plywood remains to be determined, but it does make possible the heat cure of resin bonds in thick blocks or in the skeletonized parts of airplane assemblies where heat otherwise cannot be applied.

APPLICATIONS of plywood which are becoming increasingly important in the defense program are more readily visualized with these recent developments in perspective against the contrasting background of earlier limitations. Airplanes are one of the major products in which plywood can be of substantial importance in the present defense program. Perhaps the most obvious way in which plywood can serve the airplane builder is that of skin covering for the wings, tail parts, rudder, ailerons, stabilizers, and the like. Here the external streamlining of plywood, combined with its factor of stiffness to weight, gives it advantages over thin metals, which require riveting and welding and are less able to resist the aerodynamic forces without buckling and vibrating. The multitude of ribs and framing members required to support metal facings can be substantially reduced in constructions where several layers of plywood covering are superimposed for stiffness, all within permissible weights and strengths. Adequate resin adhesives are available for both the plywood bonding and the assembly operations. Plywood wings are now extensively used in military training ships.

Plywood fuselages, of molded *monocoque* shapes, have been made and flown successfully. Molded noses and nacelles, from plywood, are in actual production for several types of Canadian fighter planes. The chief drawbacks here are the lack of scientific strength-data and the formulas essential for efficient design.

Spruce spars are almost universal in smaller planes, yet solid spruce is scarce and costly. Laminated spruce is stronger than solid spruce, easier to obtain, far more uniform, with greater yield from the log. The chief problem in the use of spruce spars is that of attaching them to the fuselage and the landing gear; normal spruce has relatively low bolt-holding power. Solution of this problem is offered by high-density plywood with raised, or embossed, knobs on one side. The knobs can be pressed (i.e., drawn by bolts) into the lighter and softer spruce and firmly glued in addition. These high-density plywood attachment plates distribute the load transmitted from the landing gear, over as large an area of the spar as is necessary. Not only do they serve to reduce the use of metal but they can be made by woodworkers on woodworking machines, both of which are far more plentiful than the corresponding facilities in the metal field.

Plywood ribs for wings and ailerons can be routed to shape, leaving tension and compression members as well as gusset braces all in one piece.

Propellers need to be sturdy at the hub, where weight is not objectionable, and light in weight at the tip, where centrifugal forces are serious. Variable-density plywood meets these requirements and gives to the blade the resiliency of wood and the excellent fatigue characteristics of wood. Propellers so made are extensively used in England. These adaptations of plywood to airplane construction refer specifically to the smaller and lighter planes, including perhaps all types of training ships for military aviators. Experience must be gained in these smaller units, so that changes from metal to plywood in the larger planes may be based on actual demonstrations of serviceability under severe conditions. For the present, many nonstressed parts of the larger planes, such as bomb-bay doors, instrument boards, manhole and handhole rings, covers, doors, floors, and the like, may be safely made of plywood. An ingenious ribbed plywood floor, combining great stiffness with light weight, has recently been patented.

In large seagoing vessels, plywood has established a distinct place for itself in partitions and bulkheads. Crossbands and faces are glued to a lightweight asbestos core, providing fireproofness together with attractive and noncorrodible surfaces. Plywood can also be made with metal faces, or metal inner layers. Curved and rounded partitions can be made of plywood of still different constructions.

Many smaller vessels, such as destroyers, Coast Guard cutters, and the like, are designed with plywood bulkheads, dividing the boat into many compartments, for safety. Such bulkheads also serve as important strength members in the boat structure. They are lighter and more resistant to the elements than is metal, more free from shrink and swell than is solid wood, and far less prone to cracks and leaks. Plywood sheets up to eighty feet long by eight feet wide have been made for the hulls of such boats and are now in actual production in the South. Several layers are used on the hull, with staggered joints. For the (*Concluded on page 92*)

ROLLING OFF A LOG

(*Concluded from page 90*)

superstructures on such watercraft, streamline housings of molded plywood are beyond the experimental stage and may soon become standard.

The utility of plywood in boats increases as the size of the boat decreases. For boats twenty feet and under, thousands of hulls have been made by the flexible-bag molding process. Ribs and framework can be substantially reduced and often eliminated. Angling strips can be placed inside to serve as bracing members. Plywood for such boatwork is usually made in two-ply sheets, several layers being used to add up to a total thickness of ½ inch and more. These boats are far lighter and sturdier than those of the conventional construction, and the problems of shrinking and calking are practically eliminated.

Another interesting development is a pontoon molded from veneer and plywood. It weighs far less than sheet metal, so that fewer men can handle the units and truck-carrying capacity is multiplied severalfold. These pontoons are clamped together to support the runways of temporary pontoon bridges. The pontoons nest on the truck bed and require a height of less than one foot per unit. Ramps, or walkways, for use in pontoon bridges are also being made of plywood. Life rafts and towboats are other applications of the material.

Periodic rumors are heard that the supply of black-walnut lumber for gunstocks is inadequate; in any event, the elapsed time from the green tree to the seasoned blank is unreasonably long. Plywood has been tested and found adequate, and is much more quickly available. Several species of veneer, pressed to the desired density, can be used.

When made of solid lumber, army lockers for soldiers' personal possessions are heavy and likely to develop unsightly and untidy cracks. With metal lockers, moreover, rust, corrosion, and denting become serious problems. Waterproof resin-bonded plywood hence has been used extensively in recent contracts.

Passing mention should be made of other kinds of plywood utilization common to both civilian and military life. Among these are concrete forms, prefabricated housing for defense workers and for military cantonments, furniture for living quarters and for offices, truck bodies, profiles for shipbuilding, patterns for foundry work, industrial buildings and equipment, partitions, and many other products, which will be described more fully in a succeeding article.

Those who have studied the many problems involved in the intelligent use of plywood are becoming more keenly aware of the fact that it cannot be adequately evaluated and utilized according to the experience and knowledge gained from the use of metals. Wood and plywood have qualities and advantages that frequently are quite different from those of other materials. Certain tasks can be performed better by metal products, others by units made of veneer and plywood. In no sense is one a substitute for the other. The skillful combination of both materials will result in an effectiveness, a suitability, and an economy that cannot be secured by either alone.

THE NATURE OF MONEY

(*Concluded from page 76*)

Indeed, as a final result of our consideration of the nature of money in all of its innate directness and simplicity, we may very well reach a conclusion almost the opposite of much popular opinion. Our conclusion is this: It is good, not reprehensible, for all of us to take action toward making more money for ourselves and for the firms and organizations with which we are associated. Profits are not iniquitous. Profits are good in other matters besides the consideration of the nature of money. And so great is the power of directness and simplicity that it is of inestimable use when we proceed to decide precisely and in detail the new profitable actions we are about to take.

FLYING SQUADRONS

(*Continued from page 78*)

very little use in accompanying bomber flights on long-range missions. To be sure, General Douhet, who wrote the textbooks on mass bombardment in the middle Twenties, presupposed that for fighters to convoy bomber flights would be unnecessary because the bombers would be mutually self-protecting. Experience in the current war has demonstrated, however, that bombers need convoy fighters. Breaking up tight bomber formations and dealing with the components separately have proved too easy. The necessity for convoys has forced in Europe the development of a new type of fighter — the long-range convoying pursuit. Such machines not only must be heavily armed and highly maneuverable but must be capable of going along with the big bombers to distant objectives and returning. The result has been the appearance of ships of the Messerschmitt 110 and the British Whirlwind class, twin-engine airplanes of considerable size carrying a crew of two or three men. They generally carry two or three quick-firing cannons as well as half a dozen thirty- and fifty-caliber machine guns. So far, we have nothing quite like the Me-110 in this country. Our nearest approach is the Bell Airacuda multiplace fighter, but so far it is still in the service test stage.

Out of the war have come a number of other lessons that are changing our concept of military aircraft. The matter of fire power is one. Several years back, our pursuit aircraft were armed with a couple of thirty-caliber machine guns; such armament would be considered hopelessly inadequate today. The British are putting as many as eight to twelve fifty-caliber guns and up to four twenty-millimeter cannons on their new Spitfires and Hurricanes. Some of the newer fighters carry at least one thirty-seven millimeter cannon and possibly two supplementary twenty-millimeter cannons. Such ships pack a mighty wallop. They have to, because they are in actual firing range of fast-flying enemy targets for only a fraction of a second at a time and must hit — and hit hard — while they can.

The corollary to heavier armament is more protective armor. Before the actual outbreak of hostilities, armor plate on fighting and bombing airplanes was generally considered impractical. In the Paris international aeronautical show, as late as 1938, (*Continued on page 94*)

FLYING SQUADRONS

(*Continued from page 92*)

only one machine had any armor plating, and that was looked upon more as a freak than as anything else. Obviously, from a performance point of view, one simply cannot afford to take on a number of pounds of nonstructural material just to protect the pilot and other vital parts of the plane. But current tactics have proved beyond all doubt that some sort of protection is necessary, and few modern military designs are delivered without armor today.

As a practical matter, to try to put in enough armor to stop a fifty-caliber bullet at almost any range is hopeless, but present-day armor does protect effectively against thirty-caliber slugs. As for impact of explosive shells from large-caliber aircraft cannon, a direct hit invariably means the loss of the aircraft.

The protection of gasoline tanks has taken a little different path. Instead of trying to surround them with impenetrable armor, the practice is to design and build them to be self-sealing in case of puncture by machine-gun bullets. Ever since the last War, learned discussions of ways and means have been carried on, but the current war was already many months old before any nation but Germany could produce planes of any type with self-sealing tanks. Most of the *Luftwaffe's* active squadrons were so fitted out by the end of 1939.

Such are the factors affecting the procurement of machines for United States air forces today. For our emergency program we are buying aircraft that are designed to meet the ever changing requirements of modern warfare. To facilitate buying in quantity, we have had to freeze on certain basic designs, but improvement in detail is being made with every succeeding production lot.

With the passage of time, our Air Force has settled on five basic types of aircraft. Each group contains a number of variations for special purposes. The pursuits are the Army's fighters. Fast, highly maneuverable, and heavily armed, they are to protect our bombers from opposing pursuit, or to attack and destroy incoming enemy bomber formations. Speed is essential, for the pursuit ships must outfly the fastest bombers and outfight the opposing pursuit. They are the thoroughbreds of an air force. Only the best in matériel and personnel can stand the gaff in fighter squadrons.

Bombers are of equal importance. They constitute our striking force. They form the spearhead of attack against enemy ground-positions and sources of supply. Our bombardment aircraft fall into three categories — heavy, medium, and light. The "heavies" are big, four-engine, long-range machines, the Flying Fortresses and the Liberators, capable of carrying several tons of bombs several thousands of miles.

The medium bomber, generally a two-engine type, is faster than the heavy but lacks its extreme range. Some of the mediums will outfly most pursuit ships. Because of their speed and great load-carrying capacity, they are among the deadliest weapons known.

The line between the medium and the light bomber is not too clearly drawn. Light bombers also are twin-engine ships with crews of two or (*Continued on page 96*)

FLYING SQUADRONS

(*Continued from page 94*)

three, but generally are smaller and of lower bomb capacity. Actually, the type borders on the twin-engine, multiplace fighter. The British have recently converted our standard A-20 bomber into a night fighter by reducing its bomb load and greatly increasing its armament. Such ships were formerly classified as attack types. They were used against ground troops, attacking them with machine guns or with showers of light bombs.

The mission of reconnaissance aviation is to observe and to report enemy movements. Machines for this purpose are armed for defense only. Frequently they must rely on escort fighters for protection. Some of them are designed to fly very slowly, almost to hover over a given spot. Many of them carry cameras and darkrooms on board so that aerial photographs may be taken, finished, and dropped for the use of officers on the ground. All of them carry radio and other signaling devices.

Cargo carriers transport matériel and personnel as tactical requirements dictate. Besides implementing the services of supply, cargo carriers have other uses recently developed — the transport of ground troops, the carriage of paratroops, and the towing of troop-carrying gliders. These carriers are generally evolved from standard civil transport types.

Trainers are the tools with which finished military pilots are fashioned. Student pilots begin with simple slow-flying machines to learn the principles of flight, and progress through secondary and transitional types to fast single-seaters and bombers.

These are the basic types that make up the flying squadrons of the air forces of the United States Army. Today we have not enough of any type of aircraft, but we are well on our way toward remedying that deficiency. One of the smartest moves made by the administration (although it brought down on the presidential head more than a little criticism and abuse at the time) was the release of our newest designs for planes, engines, and armament to the French and British during the early stages of the war. Their purchase orders gave the United States aviation industry its first experience with mass production. A number of aircraft manufacturers were already on the way to a considerable expansion and had acquired a nucleus of trained production personnel when the shock of our own 50,000-plane program hit them. What had been done was only the slightest start of a beginning, but there was some cushion, if only a thin one. Fortunately, we have been able to keep clear of active warfare long enough to build up our production capacity to a level consistent with current needs. We are not there yet, but we shall be close to it by midsummer unless too many monkey wrenches are allowed to clog the works.

This breathing spell has given us another inestimable advantage. The practical lessons of air warfare have been bought for us by the Royal Air Force. The things they have learned the hard way are ours for the asking. Today we are drawing without stint or reservation on the great store of experience gained from two years of actual combat. We are in a position to profit by the mistakes made by both the *Luftwaffe* and the R.A.F., and

we are doing so. Through channels that have been set up for the purpose, a vast amount of useful information is going into the hands of the designers and builders of United States aircraft. Each succeeding production model of bomber or fighter is an improvement over its predecessors. The country can rest assured that when the time comes for America's flying squadrons to engage in battle, our fighting pilots will be sent out in the fightingest airplanes in the world.

RESEARCH OR ELSE —

(*Continued from page 80*)

stranger. Inherent in the planning of the giant telescope at Palomar or the most ordinary distillation setup in a chemical laboratory is something of the same spirit that built the cathedrals of Europe.

Research has youth and vitality, and evidence of those characteristics lies in its rapid growth. Including only personnel engaged in industrial research, the present figure of about 70,000, counting everyone from the assistant bottle washer to the vice-president, is about seven times what it was in 1920. Laboratories have multiplied at about the same rate, but, even so, there is still scarcely more than one for every hundred production units.

All told, we may estimate — and in view of the haziness with which research is defined, it is only an estimate — that industry, government, the universities, and various endowed institutions are now expending in the neighborhood of $400,000,000 a year on research. In other words, the entire business of research — pure and applied, public and private — is just about as big as the rayon industry, which is one of the products of research. Thus, although a group of twenty leading universities have been reported as spending an average of 25 per cent of their income on research, and progressive industrial concerns may spend anywhere from 2 to 10 per cent of their gross sales, the proportion of the national income that goes toward this means of insuring our future security, while no longer trifling, is obviously minor in relation to the protection afforded.

This concept of research as insurance is particularly strong in industry where, as Roland P. Soule puts it, "The fundamental objective of industrial research is the insurance of the continued existence of a business . . . in a competitive and changing world." What with ingenious competitors, with markets that suddenly expand or, more disconcerting, disappear altogether, with shifting legal and political barriers, and with rapid social changes, a little insurance is in order. Millers, for example, have for many years been faced with shrinking markets as people turn from bread to other foods. Every census shows an older and more slowly growing population, a matter of concern to manufacturers of baby carriages and cement mills. Some day this war will end, releasing the labor of millions of poorly paid European and Asiatic workers. And so it goes. In the impartial judgment of the stock market, an efficient research organization is better than money in the bank. The stocks of companies like Du Pont, Eastman Kodak, and General Electric almost invariably (*Continued on page 98*)

RESEARCH OR ELSE —

(*Continued from page 97*)

have lower ratios of dividends to prices than have the stocks of companies in similar fields but without notable reputations for putting out new products of superior properties.

Industrial research is, nevertheless, a rather dilute version of the real thing. Charles F. Kettering, Vice-President in Charge of Research for General Motors Corporation, has stated that 40 per cent of that company's research budget goes for engineering; another 40 per cent for consulting services to the various divisions of General Motors, i.e., for more engineering; and 20 per cent for pure science and long-shot problems, i.e., for research.

Such a division of funds as this one is typical. The routine testing, the engineering analyses, and the development work which take most of the money would have to be done anyhow, whatever they would be called in the budget. It's not such a bad idea to call them research, since they demand the same mental state of mind on the part of the personnel, are fed from the same pool of knowledge from which research derives its strength and to which it is constantly adding, frequently make use of the same facilities, and merge imperceptibly into the purest of pure research. And besides, research is a word with glamour. It sits well with the advertising staff and the public.

If a sharp division exists between an engineering problem and a research job, no one so far has been able to discover the division. Roughly, a problem falls into the development classification if the means of solving it are fairly straightforward. Thus, the construction of an automatic mechanical transmission for an automobile, while it may involve intricate engineering calculations, a good deal of invention, and much testing, is primarily a development job, since the work is in fields which have already been well explored. Relatively little new knowledge has to be turned up to solve the problem.

On the other hand, the investigations which uncovered the factors causing the detonation of fuels in internal-combustion engines, which found substances capable of reducing knock, and which have also resulted in certain theories as to why fuels with one molecular shape should knock and fuels with another molecular structure should not, are splendid examples of research; to be a bit more specific, they are examples of "applied" research, since they had from the first a specific, materially valuable objective. If the sole objective is the desire of the scientist to know, as when he studies infrared spectra in order to find how far an atom of hydrogen stays from an atom of oxygen in a molecule of water, that activity is generally classified as "pure" research. There's no telling when one variety will change to the other. Some technician, attempting with the most materialistic motives in the world to improve a radio tube, may suddenly find himself faced with the necessity of studying the antics of an electron in a semiconductor. Students of atomic physics, only a few years ago as isolated from this crass world as are astronomers (if the astronomers will permit the simile), now find that their artificial radio-active substances have a host of practical applications.

It is pertinent to remark, as an aside, that nothing is more invigorating to pure science than a thoroughly mundane application of its discoveries. As long as science was essentially a philosophic study from which society derived no discernible benefit — at least to its short-lived memory — science was lucky to be left alone. But under the impact of one tremendous material gain after another, society has mellowed to the point where money is available even for such structures as a 4,500-ton cyclotron. That is a long step from the pyramids.

Perhaps this is also the step which will mean the difference between extinction and existence for our culture. With monotonous regularity, previous cultures have blossomed, flowered, and faded into oblivion. However much they might have realized that their way of life was disintegrating, and apparently some were aware of that fact, they were as helpless in stemming the trend as were the dinosaurs. In the present period of gathering twilight, it is difficult to state with conviction that our own civilization is the first to be immune to this cycle and is in no danger of breaking up — with a louder bang than any before it.

In one profound respect, however, this civilization appears unique: In research and in the frame of mind which makes research possible, it possesses a regenerative, indeed a seminal, force. Increasingly, the attitudes of research — its objective accumulation and dispassionate analysis of data, its (*Concluded on page 100*)

RESEARCH OR ELSE—

(*Concluded from page 98*)

questioning of criteria — are spreading into many fields where the actual instruments and techniques of research as it is generally thought of do not seem to apply. For example, governmental and industrial administration, particularly where it rubs elbows with research, is tending to become "scientific" or at least alert to innovations. And although many a blunder can be chalked up to an underestimate of the complexity of any problem in which human beings figure or to mere lack of horse sense (which lack can be present without benefit of science), the fact remains that the scientific approach to management pays visibly large dividends.

Encouragingly, modern art forms are also adapting themselves with gusto to the findings of science. Much of functionalism seems such an adaptation; artists and architects often show ingenuity in taking advantage of new mediums made possible by an improved technology. The Indians of northwestern America are making bigger and possibly better totem poles with the aid of the white man's steel tools. Gutzon Borglum used explosives, pneumatic drills, and steam shovels in carving the faces of four great Americans out of the granite of Mount Rushmore, and Walt Disney has created a highly pleasing something by a judicious combination of optics, electronics, and a vivid imagination.

Above all, science — and the research by which it grows — still maintains its limitless horizons. Already pointing beyond the steam turbine and the internal-combustion engine is the knowledge that power may be derived from the breakdown of atoms; beyond the present control over disease and heredity are new concepts about the inert molecule and the living gene — about the origin of life. Obviously, no guarantee can be furnished that research will be permitted to continue functioning on a scale and in a manner that will permit it to be effective, or that, even if it does function to maximum effect, it will alone be strong enough to counteract the disruptive forces affecting society. But there appear few other directions in which to turn for a continued comfortable existence in this hard and unpredictable world. Barring a sudden shift for the better in national and international morality, it looks like research or else —

THE TREND OF AFFAIRS

(*Continued from page 68*)

in terms. Such implements, however, are important in the tool kits of metalworkers — not only those who take the dents out of fenders — and others who must shape finely finished surfaces or adjust delicate machine parts or work and form light sheet-metals. The adaptable plastics find a new application in the development of plastic tips, or faces, to be employed on jobs where the hammer must not mar the work. These tips are readily replaced when worn. ¶ An ocean-going tanker 445 feet long, with a beam of sixty feet, started for her sea trials lately. Nothing very spectacular in that. But she is rare if not unique among ships in that she is the first of her size — 12,500 tons — to be partly constructed while afloat. The electrically welded hull of the vessel, launched sideways in the Hudson River last April, floated in the river a mile from downtown Albany while engines and other equipment were installed. More than half the work of building the finished $1,000,000 vessel was done after she was water borne. This departure from usual building technique is regarded as of considerable consequence in view of the congestion of shipbuilding facilities in the country. ¶ Some relation between arteries and automobiles — human, not traffic arteries — is suggested in findings reported by Leon Brody after a one-year study of personal factors in the safe operation of motor vehicles. In the group of drivers whom he observed, half were listed as good, not having had a reportable accident; half were chronic accident repeaters selected through the co-operation of the New York State Motor Vehicle Bureau. Seventy-seven per cent of the repeaters had relatively low blood pressure; only 12 per cent of the good drivers were so characterized. Systolic blood pressure, ability to see to the side, ability to pass on the road, and correctness of response under pressure of time, according to Dr. Brody, are four tests which can be used in predicting accident tendencies. ¶ From 100 pounds of dry sawdust, which is either burned as fuel or wasted at the rate of eight million tons a year, nearly $8.00 worth of chemicals (*Concluded on page 102*)

THE TREND OF AFFAIRS

(*Concluded from page 100*)

can be recovered, the American Chemical Society lately was told. Fusing sawdust with lye and treating the resultant mass with lime and sulphuric acid produce oxalic acid, important because of use in the manufacture of celluloid, rayon, leather, textiles, and other vital products. Acetic and formic acids, as well as wood alcohol, also can be recovered from sawdust. ¶ The 100,000 tons of silver now in storage in government vaults would be taken out and put to work "for the duration," according to a scheme proposed by Robert E. McConnell of New York City, chairman of the Engineers Defense Board. Since silver is an even better conductor of electricity than is copper, and since the government ingots could be converted into bus bars and wire at relatively slight cost, substitution of silver for copper in the electrical equipment of new aluminum and magnesium plants now being built appears to offer a means of relieving the present acute copper shortage. The silver thus used would be as safe as it is in the vaults, both because the plants will operate twenty-four hours a day and will be constantly guarded, and because the wires will be alive all the time. After the emergency, it is held, copper could replace the silver, which would then be returned to the vaults. ¶ For America's need of scrap iron and steel, no equally ingenious solution appears immediately available. One steel producer, however, tried working its own back yard and got surprising results. Warning of the danger of shutdowns of furnaces if supplies of scrap were inadequate, it sought to round up the scrap available in two communities where it operates plants. Through local dealers, some 8,400 tons of scrap were accumulated in the first two weeks of the campaign. ¶ The ubiquitous slot machine has begun to offer a new service, in automatic ice-delivery stations in use on the Pacific Coast. They deliver a paper-wrapped 25-pound block of ice upon deposit of the proper sum.

THE INSTITUTE GAZETTE

(*Concluded from page 85*)

is to set uniform standards for intensive undergraduate courses to be given at the forty co-operating institutions. These courses in the new electronic field, which is closely related to radio and television, will be offered for seniors in electrical engineering or physics. In general, the courses will supplement regular radio instruction and will have particular reference to the equipment and circuits involved in the production, reception, control, and application of high-frequency waves. Although, for the present, attention will be directed principally to applications of high-frequency methods to problems of the emergency, the fundamental training in these courses will serve as a valuable preparation for new and significant advancements in the art of radio communication after the war.

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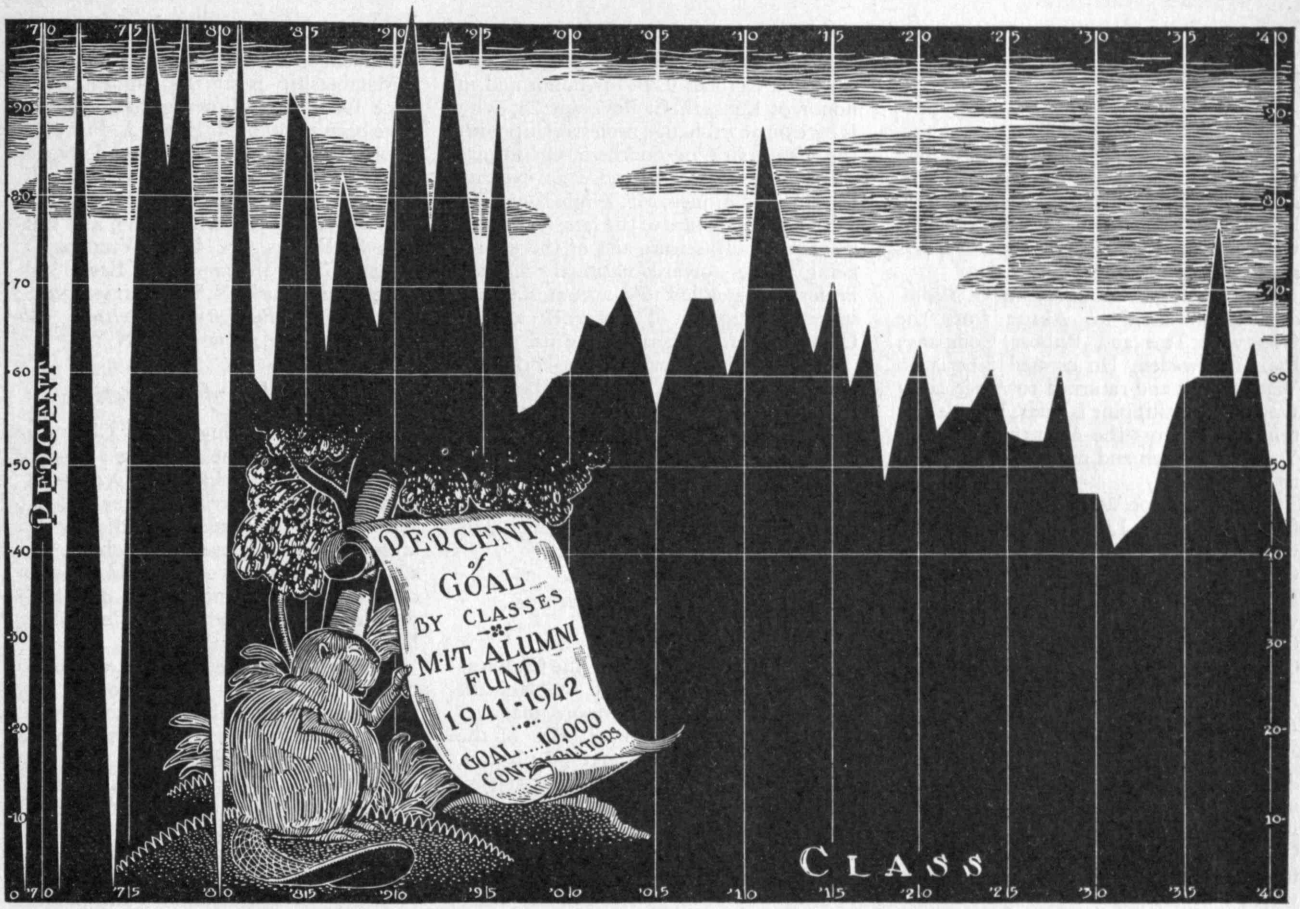
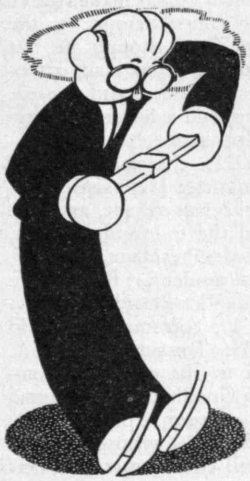
TECHNOLOGY MEN IN ACTION

THE ALUMNI FUND—ITS PROBLEMS AND GROWTH



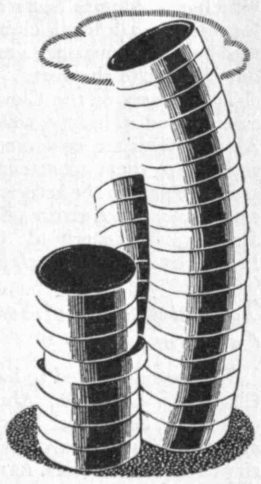
CONTRIBUTORS BY CLASSES, IN PER CENT OF ESTABLISHED GOAL

. . . as set by Alumni Fund Board, top policy-making body of M.I.T. Alumni Fund. Goal: Ten thousand Alumni to contribute annually an average of $15. Basis for Goal: Past performance, records of other college funds. How do results look to date?



MEN: On November first, 6,729 Alumni of M.I.T. had contributed to their annual Fund 67 per cent of the established goal. A large number of these (over 800) had not contributed the previous year (Fund's first). Of those who last year evidenced their loyalty in this manner, approximately 1,900 had not yet responded. *If these Alumni again contribute*, and the ratio of so-called "new contributors remains relatively constant, the goal of 10,000 is not out of sight.

DOLLARS: By November, the Fund had reached a total of $65,215.36. Somewhat higher than last year at the same time, it still fell far short of the hoped-for $15.00 average. The actual average, $9.69, did not reflect ballooning national income. Apparent explanation: lack of realization of Fund's importance to Institute; assumption it was still in alumni dues category. (Forty-four per cent of all contributions were exactly $5.00, former dues figure.)



A report on the M.I.T. Alumni Fund as* Fortune *might have presented it

NEWS FROM THE CLUBS AND CLASSES

CLUB NOTES

M.I.T. Club of Akron

In June the wives of club members held their annual picnic at the home of Mr. and Mrs. Francis P. Hammond '25 in Hudson, Ohio. About twenty couples were present for an afternoon of sports and for a picnic supper.

During the past summer Emil O. Malmquist '28 returned to Akron from the Goodyear Tire and Rubber Company, Inc., in Sweden. He crossed Siberia to Vladivostok and returned to America by way of the Philippine Islands. It took him ten days to cross the Atlantic from New York to Sweden and ten weeks to return to Akron.

Ray A. Hudson '26 has been transferred from Akron to Litchfield Park, Ariz., where he will be in charge of the new Goodyear aircraft plant to be erected near Phoenix. — The first meeting of the year was held on October 27. — James E. Connor '23, *Secretary*, 1746 13th Street, Cuyahoga Falls, Ohio.

M.I.T. Association of Cleveland

As usual the Association did not meet during the summer. On October 16, seven members of the executive committee met in the Mid-Day Club atop the Union Commerce Building to discuss programs for the year ahead. Those who attended were Seymour Colton '21, Willard Loesch '21, Charles Cristal '23, Charles Springer '23, William Sessions '26, Howard Ferguson '27, and Arthur Zimmerman '37.

The committee decided that the first meeting of the Association was to be held in November, and arrangements were made to obtain for that occasion a speaker and the new colored film of Technology, which the Alumni Secretary has offered for use by all local clubs. — Meetings will be held about once a month throughout the rest of the year.

The officers of the Cleveland Association extend a hearty welcome to those Alumni who are newcomers to our city and invite them to attend our meetings and take part in the activities of the Association. — H. Arthur Zimmerman '37, *Secretary*, Weatherhead Company, 300 East 131st Street, Cleveland, Ohio.

Technology Club of Southern California

We were delighted to have a visit from Charles E Locke '96, Alumni Secretary, on Friday, September 5, when a group of about twenty Alumni met at the University Club, Los Angeles. As usual, Professor Locke gave us an interesting and informative talk on the latest news at Technology.

We had a visit from Robert M. Kimball '33, Assistant Director of Admissions, on October 9. In his honor and in honor of Kenneth C. Reynolds '25, who is here on an exchange professorship with the University of Southern California, thirty-four Alumni attended an evening meeting and dinner. Mr. Kimball gave us a descriptive picture of the latest developments at the Institute and of the efforts being made toward national defense. Professor Reynolds told an entertaining story, principally of his work at the University of Southern California.

In the event that you do not know the new officers of the Club, here they are: Ralph B. Atkinson '29, President; H. Royce Greatwood '25, Vice-President; and Henry B. Dean '28, the flunky who does all the work. — Henry B. Dean '28, *Secretary*, Union Oil Company of California, 617 West Seventh Street, Los Angeles, Calif.

M.I.T. Club of Northern New Jersey

The annual fall smoker of the Club was held on November 12 at the Newark Athletic Club. Robert J. Moore, manager of the development laboratories of the Bakelite Corporation, spoke on plastics. Richard C. Reager, head of the department of public speaking at Rutgers University, told us what to do and what not to do when speaking in public.

Jack Keck '23, vice-president in charge of membership, supervised for this meeting the getting in touch with the fifteen hundred Alumni in northern New Jersey, and he will do the same for other meetings. — Newton S. Foster '28, *Secretary*, 73 Daniel Avenue, Rutherford, N.J. *Assistant Secretaries:* Robert F. Way '33 and Walter L. Wise, Jr., '34, Colgate-Palmolive-Peet Company, 105 Hudson Street, Jersey City, N.J.

Technology Club of New York

The annual bridge tournament at the Club began on October 8 and continued once a week to November 15. Five tables of contenders competed for the Dick Ranger Trophy and other prizes. Many veterans of previous tournaments, as well as several dark horses who offered serious competition, took part in the contest.

Activity at the Club is continuing at a high level. The dining rooms are filled for luncheon and dinner. The all-Technology table at luncheon, where men who arrive alone or who desire more company can dine with former classmates, is always filled to capacity. — The taproom and bar are also popular. — Many private and class functions are taking place at the Club. Class events include the Class of '22 dinner on November 13 and the Class of '24 luncheon on November 27.

Membership is at the highest point since 1928. The following new members have been announced: Henry A. Fiske '91, George L. Harris '01, Linwood I. Noyes '17, John W. Church '22, William E. Delehanty '24, Malcolm S. MacNaught '24, William L. Howell, Jr., '35, and William S. Foulks, Jr., '42. — William D. Neuberg '18, *Secretary*, 24 East 39th Street, New York, N.Y. Constantine S. Dadakis '34, *Publicity Committee*, 644 Riverside Drive, New York, N.Y.

Technology Club of Rochester

The annual meeting of the Club was held at Lee McCanne's cottage at Seneca Point, Canandaigua Lake, on October 11. Members began to arrive at three o'clock, and interest centered immediately on target shooting, horseshoe pitching, and a baseball game between the odd and even classes. The excellent supper, details of which Lee McCanne '27 handled all by himself, started at 6:30.

The business meeting was called to order at 8:00 P.M., and a motion was made and immediately passed to dispense with the reading of the minutes from the previous annual meeting. The Secretary read the names of five members from the Class of '85 whose addresses Arthur K. Hunt, Secretary of that Class, is seeking. The Secretary also read part of a letter written on July 1 by H. B. Richmond '14, chairman of the Alumni Fund Board. This letter laid out the objectives of the Alumni Fund and pointed out what is necessary to meet these objectives. The Secretary then briefly summarized the year's activities.

After hearing Bob Smith '33 present the treasurer's report on the Scholarship Fund, John Ancona '03 pointed out that Bertram C. Hopeman '00 has made sizable increases in his contributions to the Scholarship Fund even though he has been out of the city. Ancona made a motion, which was seconded and passed, that the Secretary send a letter of appreciation to Mr. Hopeman.

King Crofton '22, chairman of the nominating committee (consisting of Jerry Lane '13, who was absent, and Bob Smith), proposed the following officers, who were elected: President, Cyril J. Staud '24; Vice-President, Ralph W. Peters '30, second Vice-President, Howard S. Gardner '30; Secretary, Winfield Partridge, Jr., '33; Treasurer, John A. Rodgers '35; and to the executive committee, O. Glenn Goodhand '31. Edmund H. Miller '23, whose term expires in 1942, and Stanley C. Wells '30, whose term expires in 1943, will continue as members of this year's executive committee. — John Ancona gave a summary of the

year's activities of the scholarship committee, pointing with pride to the general success obtained by the boys who have been assisted by the Club. Scholarship awards of partial tuition were made this fall to Everett T. DeGuzzie, Hrand Saxenian, and George H. Werner. A motion of thanks and appreciation was made and passed for Ancona's fine work on the scholarship committee.

A standing vote of thanks was given to Lee McCanne for his generosity and excellent job in providing a place for the annual meeting. — The meeting closed in the customary manner, with Hank Couch '20 leading the singing of the "Stein Song." — WINFIELD PARTRIDGE, JR., '33, *Secretary*, 76 Magee Avenue, Rochester, N.Y.

Washington Society of the M.I.T.

The Society started its fall season with a bang. One hundred and fourteen M.I.T. Alumni and guests inspected the new Washington National Airport at Gravelly Point, Va., on Friday, September 26, at 5:15 P.M. The resident engineer, Mr. Roundtree, conducted the group to the roof, which is normally inaccessible to visitors. From that vantage point he explained many features regarding the field and equipment. After the inspection of this most modern of airports, we adjourned to a special section of the main dining room to enjoy an excellent dinner, following which many of the members continued the inspection of various facilities of the airport. The number of new members at this meeting is an encouraging indication of what may be expected in the way of well-attended meetings for the winter season. Unfortunately, because of urgent business, Merton Emerson '04, President, could not be on hand. Bill MacMahon '22 and Proctor Dougherty '97 shared honors as masters of ceremonies.

The following other M.I.T. men were present: Granville H. Parks '87, George W. Stone '89, William B. Poland '90, Frederick W. Swanton '90, George W. Stose '93, Joseph E. Thropp, Jr., '94, Benjamin A. Howes '97, Frederick A. Hunnewell '97, Henry M. Loomis '97, Charles Bittinger '01, John Boyle '01, Paul Weeks '02, Harry H. Groves '04, Amasa M. Holcombe '04, George H. Shaw '04, Ben E. Lindsly '05, Parker Dodge '07, Rudolf H. Kudlich '07, Edward D. Merrill '09, Holman I. Pearl '10, Harold S. Lord '11, Carl G. Richmond '11, George A. Robinson '12, Alfred E. Hanson '14, Aubrey D. Beidelman '15, Mrs. Parker Dodge '16, Horace M. Baxter '17, Herbert L. Bone '17, Edwin J. Grayson '17, Dustin W. Wilson '17, Hamat D. Manuelian '18, Harold F. O'Donnell '18, Louis J. Grayson '19, Edward E. Saunders '19, Merritt P. Smith '19, Donald C. Stockbarger '19, Lawrence W. Conant '21, Rudolf H. Blatter '22, Ralph S. Hayes '22, George R. Hopkins '22, William D. Pinkham '22, Frederick H. Untiedt '22, Excellenza Morse Westby '22, Paul J. Culhane '23, Robert H. Park '23, William V. Cash '24, George D. Fife '24, George E. Lamb '24, and George M. Tapley '24.

Also present were: Louis F. Kreek '25, Harry B. Swett '25, John G. Fletcher '26, Mary O. Soroka '26, Roland L. Hutchings '28, Carroll C. Smith '28, John A. Plugge '29, Fred N. Ricks '29, Raymond Underwood '29, Alfred G. Ennis '30, Oliver G. Green '30, John A. Mathews '30, Mario V. Caputo '31, George C. Humphreys '31, Tim L. McNamara '31, Donald K. Morgan '32, Frederick M. Moss '32, John A. Robertson '32, Joseph E. Carbonell, Jr., '33, Samuel Joroff '34, George E. Wuestefeld '34, Hamilton H. Dow '35, Herbert Small '35, William W. Smith '35, Henry A. Scheel '36, James J. Souder '36, Peter White '36, Robert E. Williams, Jr., '36, George B. Hunter, Jr., '37, Ira H. Lohman, Jr., '38, Robert C. Smith '38, Andrew L. Fabens, Jr., '39, Elihu Root, 3d, '39, Frederick F. Schaller, Jr., '39, Morton A. Copeland '40, Frederick M. Mann, Jr., '40, Sam Fry '41, Harlan E. McClure '41, Marshall A. Pease '41, Ralph D. Bennett, staff, and B. H. Tower. — AMASA M. HOLCOMBE '04, *Secretary*, 4817 Woodway Lane, Northwest, Washington, D.C. WILLIAM K. MACMAHON '22, *Review Secretary*, Rosslyn Gas Company, 3240 Wilson Boulevard, Arlington, Va.

CLASS NOTES

1887

Frank Abner Merrill, one of '87's outstanding members, died on July 23 at his home, 123 Dean Road, Brookline, Mass. Frank was born in Exeter, N.H., on October 7, 1865, the son of Benjamin Long and Achsah Blood Merrill.

Convinced that he would prefer finance to engineering, Frank withdrew from the Institute at the end of his first year and entered the employ of N. W. Harris and Company in 1888, first being connected with their Chicago office and later with the Boston branch, where he remained until December, 1901. He left to become the founder and senior partner of the firm of Merrill, Oldham and Company, private bankers, in Boston. For its integrity and skill the firm became one of the best known in the United States. Merrill remained as head of the firm until 1927, retiring that year, when it was purchased by the Atlantic National Bank.

On February 26, 1889, at Chicago, Ill., Frank married Carrie M. Scott, daughter of George Washington Scott, an Illinois banker. They had two sons, one of whom died in infancy. The other son died in 1934, and Mrs. Merrill passed away in October, 1939.

Merrill was kind and generous, prominent in the financial world, of rare business judgment, always deeply interested in civic affairs. His great fortitude and endurance were shown throughout his long illness. — He belonged to the Phillips Exeter Academy and the M.I.T. alumni associations and to the Society of Colonial Wars. He was a member of the University and Union clubs of Boston and the Longwood Cricket and Country clubs of Brookline.

From the Chicago *Tribune* we received the obituary of a member of the Class who attained great prominence in the architectural field. Jarvis Hunt died in St. Petersburg, Fla., on June 16. "He was born 82 years ago in Weathersfield, Vt., and was educated at Harvard university and . . . Technology. He came to Chicago to build the Vermont building at the 1893 Columbian exposition and stayed here.

"Among the buildings designed by Mr. Hunt were the Kansas City Union terminal, Dallas Union terminal, Newark museum, Bamberger's department store in Newark, Saddle and Cycle club, the original group at Great Lakes Naval Training station, Butler Brothers, 900 North Michigan avenue, Lake Shore Athletic club, Chicago Golf club clubhouse at Wheaton, and 30 North Michigan avenue. He was a member of the firm of Hunt and Bohasseck until his retirement in 1927.

"He leaves a son, Jarvis Hunt Jr., a daughter, Mrs. George McMurty of New York; two sisters, Mrs. William E. Patterson, Bar Harbor, Me., and Mrs. H. S. Tantor, Darien, Conn., and a brother, Leavitt J. Hunt, Greenwich, Conn. . . ."

Your Secretary hopes for more cheerful news for his next chapter, if it is possible to arouse some of our correspondents. — NATHANIEL T. VERY, *Secretary*, 15 Dearborn Street, Salem, Mass.

1888

Ellery F. Coffin was in the Secretary's section in mathematics in '85. He had not been seen or heard from again, however, until recently, when he wrote from Beltsville, Md., as follows: "I was a member of the Class of '88, but I was not graduated. After my first year at the Institute, my father wanted me to work for him in his charcoal pig iron, blast-furnace industry at Muirkirk, Md. . . . I worked for him until he retired, at which time I became owner and manager of the works.

"Later I was superintendent of a blast furnace in India. The furnace was owned by the Maharaja of Mysore. Operations there were given up when the market for iron products failed."

William and Mrs. Besler drove to Princeton from Plainfield about the middle of October to make a call on the Secretary and Mrs. Collins. We were surprised to see Bill looking so well after the ordeal he went through the past year.

Everitt Taylor sent out invitations to his exhibition of etchings in Newark, N.J., during the last ten days of October. Thirty-six etchings were being shown, including "The Square Rigger," the most stately of all. Taylor's design for the title page of the *Technique* of '86, our junior annual, won the first cash prize that he ever received.

Another classmate, F. L. V. Hoppin, who recently passed away, made ten of the illustrations for this same *Technique*. Buttolph sent me a two-column article from the Providence, R.I., *Journal* of September 28 giving the complete story of Hoppin's life in this country and abroad. The article ended with the fol-

1888 Continued

lowing statement: "Frank Hoppin was that rare creature — a serious artist and a completely elegant man of the world. . . . He will never be forgotten by those who knew him, and is remembered as one of the most distinguished personages among all those who have trod the stage of Newport's complex cosmopolitan society these many years!"

Your Secretary left Chebeague Island in such a hurry on October 5 that he forgot to take with him John Runkle's autobiography, so it will not appear in this column as promised. — Sanford Thompson is still pushing things along in the office of the Undersecretary of War, Room 7273, New War Department Building, Washington, D.C. — The Secretary has just been notified that he will be presented a special fifty-year membership medal by the American Society of Mechanical Engineers on December 3. — BERTRAND R. T. COLLINS, *Secretary*, 39 Wiggins Street, Princeton, N.J. SANFORD E. THOMPSON, *Assistant Secretary*, Thompson and Lichtner Company, Inc., 620 Newbury Street, Boston, Mass.

1889

The Class convened for the fifty-second time on the afternoon of June 9 at the home of the Secretary. Nineteen veterans showed up, plus Charlie E Locke '96, Alumni Secretary. All looked younger than they did last year. Especially welcome were several who are comparative strangers at reunions, among them Paul Hawkins, John Linzee, and Clarence Norris. Conversation was genial, spontaneous, and, as always at '89 gatherings, on a high intellectual plane. Interesting letters were read from members in distant cities. The Secretary reviewed the results of the recent class presidential election and declared that Frank Hobbs had been elected in a free and fair election. Frank received the news with becoming modesty and intimated that during his administration, '89's standard of living would not be reduced if he could help it, nor its hours of work lengthened. The Secretary reminded the Class that at the fiftieth reunion, in June, 1939, it had voted that in its opinion there would not be a war. Your Secretary asked to have this vote rescinded, so that the records might be kept straight for posterity, but action on this request was refused for some abstruse reason. Other classmates present were: Bliss, Bosworth, Bridges, Cutter, Durfee, Fiske, E. V. French, Gleason, Hobbs, Howard, Kilham, Lewis, Marsh, Mildram, Orrok, and Smith.

Jasper Whiting died on August 18. The following is taken from the Boston *Herald:* "Jasper Whiting, 73, inventor, soldier and newspaperman, died . . . at his home after a long illness. He devised a method of producing Portland cement from waste products in 1889, and in 1907 he invented the Whiting cell for the manufacture of chlorine gas and caustic soda, ingredients used in making paper. In the World War, he served as a captain in the U. S. Signal Corps, and later with the rank of major in chemical warfare service, headed a liaison commission of the British-American gas services in England. He was decorated with the Purple Heart in 1920 by the War Department and personally commended by Gen. John J. Pershing. A native of Charlestown, Mass., . . . in 1900, he was a war correspondent for the London (England) Westminster Gazette during the Boxer Rebellion. Mr. Whiting was president of the Alumni Association of M.I.T. in 1914–15, afterwards being elected to the corporation of the institution. He was a member of the Tavern Club of Boston and an extensive traveler, with Mrs. Whiting, to remote parts of the world. Since 1927, he had lived in Dublin. He leaves his widow, the former Marion McBurney Schlesinger, whom he married in 1905. . . ." — WALTER H. KILHAM, *Secretary*, 126 Newbury Street, Boston, Mass.

1891

We are working on the class record book. The copy has gone to the printer, and the book should be nearly completed by the time you read this. Gorham Dana and his committee were right on the job as soon as the summer holidays were over. As usual, Gorham spent the summer at his home, "Ematuyus," New London, N.H.

Fred Blanchard expects to spend the winter in Florida. He is improving after a long siege of illness, and we hope he will be in good shape again soon. He was greatly missed at our big party. — Our sympathy goes to Ernest Tappan, whose wife died on October 8. Before her illness, Mrs. Tappan attended our reunion luncheons.

Giff Thompson is still at 152 Harvard Street, Brookline, Mass., and he would be glad to see his classmates at any time. He gets out very little. — As usual, Harry Bradlee spent part of his summer at the Mount Washington Hotel, Bretton Woods, N.H.

Barney Capen is getting along comfortably and is now at Mrs. Lillian Badger's convalescent home, Main Street, Ashland, Mass. — George Vaillant is back at 21 Chauncy Street, Cambridge. We missed him at our jubilee and hope he can attend our midwinter dinner.

Your Secretary is still at his regular job, spending most of his time now on defense work, chiefly in connection with fire protection at plants making powder, explosives, and ammunition. — We are sorry to report that Mrs. Channing Brown has been ill for some time, following a serious fall last winter. We all hope for her speedy recovery.

A letter recently received from Alonzo Hammond read as follows: "By appointment of the Secretary of War, I am in Washington for the period of the defense, serving full time as a member of the construction advisory committee in the Quartermaster General's office in the War Department. The committee's job is to recommend to the chief of the construction division of the War Department names of archengineers and contractors for the various construction projects, such as cantonments, munitions plants, and other types of construction for defense purposes.

"I came here in January as consulting engineer, reporting to the chief of the construction division on all of the cantonments under construction, but the last of February I was asked to be one of two additional men on the committee referred to above. It has been a pleasure to hear from you. . . . I am now also on a newly organized committee which acts as an adviser for small industries."

At present the class roster contains the name of 160 men. We have good addresses for 128 of these. Forty-four attended our fiftieth reunion, and sixty replied but could not attend. One hundred and fifty-five classmates have died.

The following changes in address have been received: Fred H. Briggs, 136 17th Avenue, Southeast, St. Petersburg, Fla.; and Elisha B. Bird, 1636 Pine Street, Philadelphia, Pa. — HENRY A. FISKE, *Secretary*, Grinnell Company, Inc., 260 West Exchange Street, Providence, R.I. BARNARD CAPEN, *Assistant Secretary*, care of Mrs. Lillian Badger, Main Street, Ashland, Mass.

1892

President Kales is hard at work again after spending a vacation with Mrs. Kales in the Carolina mountains and at their delightful summer home on Cape Cod. He has put up a large plant in Cincinnati and now has under way an enormous building in Detroit for the construction of bombers. One dimension of this building is more than half a mile.

Harry Carlson and Arthur Dean have been added to the fiftieth anniversary committee. A communication from this committee will reach all the members of the Class soon. Francis Walker writes that he hopes to attend the fiftieth anniversary. Let's all plan to be there. Ralph H. Sweetser is busy as Class Agent for the Alumni Fund. He could not come to our last reunion but is laying plans to be with us in 1942. — Allen French pleasantly surprised the Class by being able to appear at the last reunion in June.

Channing M. Wells was married in February at Riverside, Calif., to Mrs. Charles R. Hannan, Jr., of Council Bluffs, Iowa. In June, Channing was given a fifty-year service pin by the American Optical Company, of which he is a trustee and former president.

Word has been received that Mary Holman has moved into her new home at Lexington, Mass. She is to be congratulated for her building achievement, including the design and construction. She would be glad to have any of us ring her doorbell any day.

H. G. Fairfield now occupies new quarters, a streamline and modern-equipped home at Post Office Square in Boston for Fairfield and Ellis, a leader among insurance firms. In addition to this Boston office, the company maintains offices in Montreal and New York City. It has had an interesting career since 1902, and Fairfield has been the dominant factor in the life of the firm.

1892 Continued

This agency has over 150 regular employees, brokers, and special agents, and controls an annual premium of upwards of four million dollars. — CHARLES F. PARK, *Secretary*, Room 5–111, M.I.T., Cambridge, Mass.

1895

Yoder was appointed gasoline coordinator for the Ayer, Mass., district and persuaded his constituents that there would be a continued shortage of gasoline for civilian use. His plans went awry when Washington decreed the contrary. He is continuing his activities, however, and is enjoying his experiences with the problems of civilian air defense. — A post card will tell us what *you* are doing. Mail it now!

We regret to record the death of Harold Chase Buckminster, V, on September 27 at his home, 41 Dexter Street, Malden, Mass. Buckminster retired some years ago from active service. His record in the class book of 1920 was as follows: "Principal interest for the past twenty-five years has been the management of Quicksilver Mining Company in California, the aggregate production of the mines controlled by the Buckminster interests being more than 50% of the total production of the United States during that period. During the war the main supply of mercury for Government use in explosives was furnished by the New Idria Mine and much was supplied to the Allies. It was probably the most essential article used in the war as it was contained in every shell, cartridge and torpedo. . . ."

Buckminster was also interested in the manufacture of shoe lasts and wheat starch. He had been president of the Crystal Springs Paste Company, Malden; the Huron Milling Company, Huron, Mich.; president, director, and principal shareholder of the George P. Cox Last Company, Malden; and director of the Malden Trust Company. — Mrs. Buckminster and three sons survive him. — LUTHER K. YODER, *Secretary*, 69 Pleasant Street, Ayer, Mass. JOHN H. GARDINER, *Assistant Secretary*, 10 Clinton Place, Mount Vernon, N.Y.

1896

Con Young wrote that he was getting things in shape on Cape Cod to start during October for his annual southward trek with Abby to Fort Myers, Fla., where he expected to arrive early in November. He reported that they had experienced the dryest spell that had occurred in their fourteen consecutive years on the Cape, and that fresh water was almost at a premium. He had been gaining strength in spite of the dry weather, however, and had reached the point where he was feeling pretty good.

Gene Hultman has had an honorary job given him by the Massachusetts legislature, which made him a member of the state planning board. Furthermore, the legislature put it up to the District Water Supply Commission, of which Gene is chairman, to make an investigation and report to the next legislature in regard to enlarging the number of municipalities eligible to take water from the new Quabbin development in Massachusetts.

Many of us will remember our classmate Henry A. Pressey, who was graduated in the Course in Civil Engineering and was located in Washington after graduation. Pressey disappeared from Washington after a few years and has been lost to us ever since. The Secretary has now received authentic information that Pressey moved around through the west and southwest and finally died in Oklahoma a few years ago.

The difficulty in delivering European mail is illustrated by the return of reunion announcements sent to our classmate Pierre Richards in Paris last spring. After six months, these came back with the notation that service was suspended.

Our classmate Mrs. Marion Lewis Lee has finally given up the family home in South Walpole and has moved to New York City, where she will be found at 1563 Metropolitan Avenue, Parkchester.

The engagement of Frank Streeter Gardner '38 to Eleanor Eddy Barnum of Riverside Drive, New York City, has been announced. She is the daughter of the late Harry H. Barnum, a professor of Istanbul, Turkey, and Dr. Gardner is the son of our classmate Henry Gardner.

Paul Litchfield continues to receive considerable newspaper publicity, the latest thing coming to the Secretary being a clipping from the *Times-Star* of Alameda, Calif., which set forth at length the details of Paul's training and his achievements in the rubber industry.

Further information has been obtained on Huey, whose death was noted in the last issue. He had been ill for two months, but the end came quickly from a sudden heart attack. Among the positions which he had held was that of fire commissioner of Everett. Recently he had been a painting contractor there. His daughter Eleanor is now Mrs. Baker and his daughter Harriette is now Mrs. Smith.

Some further progress has been made by the Class in the contributions to the Alumni Fund for 1941–1942. As of October 15, contributions from the Class amount to $952 from 81 contributors, or an average of $11.75 per contributor. — CHARLES E LOCKE, *Secretary*, Room 8–109 M.I.T., Cambridge, Mass. JOHN A. ROCKWELL, *Assistant Secretary*, 24 Garden Street, Cambridge, Mass.

1897

James G. Moran, former president of the Massachusetts State Senate, died at his home in Mansfield, Mass., on April 12, at the age of seventy-one. He was a graduate of Lawrence Academy and Groton. In 1911 he was appointed postmaster at Mansfield and a few years later was made a representative to the general court. In 1922 he was elected to the senate, and in 1935 was made its president.

Just before the time limit for class notes for this issue of The Review, your Secretary learned of the death on October 11 of David Dudley Field, II. No particulars are available at this writing. —JOHN A. COLLINS, JR., *Secretary*, 20 Quincy Street, Lawrence, Mass.

1900

From the Boston *Herald* of June 24 we learned that Charles E. Paul, II, chairman of the department of mechanics at Armour Institute of Technology, will retire this year. Professor Paul is a native of Belfast, Maine.

We regret to record the death on September 1 of Daniel E. Maxfield, II, at his home, 226 West Johnson Street, Philadelphia, Pa. He was sales engineer for Stokes and Smith Company, and his last letter described his interesting work in connection with package machinery.

An article appeared in the Wilmington, Del., *Journal* of September 20 describing the hobby of Nathaniel D. Rand, VI, whose collection of picturesque covered bridges has been garnered from twenty states and several foreign countries. Switzerland, Italy, and India contribute the exotic representations. "A native of Boston, Mass., Mr. Rand . . . became an engineer for the American Bell Telephone Co. in Boston. He later went to Fort Snelling, Minn., where he was a government engineer. Mr. Rand's next port of call was Syracuse, New York, to become superintendent and technician in charge of the laboratory of Pass and Seymour Co. Here he invented a number of small electrical apparatuses. . . . Since that time Mr. Rand was employed by the DuPont Company, Atlas Powder Company, and Hercules Powder Company respectively since his retirement. He served in a technical capacity in the three local companies, training men in the use of explosives during World War I. He is the author of a number of trade magazine articles on explosives and has written similar articles for encyclopedias including Encyclopedia Britannica. The Rands have two sons, Robert, of Washington, and Quentin, a senior at the University of Delaware."

We received the following notice from the Boston News Bureau on September 30: "Charles E. Smith, vice president in charge of purchases and supplies for The New Haven Railroad, was honored several months ago with appointment on the staff of the Office of Production Management at Washington, as consultant with reference to the purchase of fuel oils, gasolines, lubricating oils, and other petroleum products for our Army, Navy and aid to Great Britain and China under the Lease-Lend Act. . . . A New Englander by birth, Mr. Smith worked his way through . . . Technology, and first worked for the New Haven Railroad back in the summer of 1897."

The September edition of *Along the Line*, published by the New Haven Railroad, features an article by Smith, entitled, "Materials," a description of the work of the purchasing department.

Harry B. Chalmers has moved to 24 East 39th Street, New York, N. Y. — C. BURTON COTTING, *Secretary*, 111 Devonshire Street, Boston, Mass.

1901

We have received a short note from Langdon Pearse in Winnetka, Ill., in

1901 Continued

which he writes that he is sorry that, because of a southern trip, he could not attend the reunion. He has been busy on the problems of the sanitary district of Chicago, where he is now in his 32d year as sanitary engineer. Their plant is the largest producer of heat-dried activated sludge in the world, and their new southwest works is the largest activated-sludge plant in the world and is being enlarged. Pearse said that F. W. Puckey is still going strong with A. D. Jenkins '03 and was recently the architect for several hospitals; and that P. W. Moore is one of the distinguished residents of Hubbard Woods, Winnetka. Phil Moore is first vice-president and treasurer of Poor and Company, Chicago, manufacturers and dealers in railway supplies in the United States, Canada, England, and Australia. He is also vice-president of our Class.

We learn that Ed Davis of the Scovill Manufacturing Company, Waterbury, Conn., has been appointed a field representative of the state defense council. Ed was lent to the council by his firm and was associated with Samuel H. Fisher, now state defense administrator, as special agent in industry during the state tercentenary celebration in 1935. At present Ed is acting as director of the Hartford Air Raid Warden School.

Ed was born in Hyde Park, Mass., and after being graduated from M.I.T. did postgraduate work at Columbia University. He was an instructor at Purdue University, and later became associate professor of economics and the registrar.

Our former Class President, Lammot du Pont, wrote from Wilmington that Ray Murray's home address is 6 Bancroft Road, Moylan, Pa. Du Pont has information that Ray is in business for himself and is engaged in bridge building.

A newspaper clipping dated June 4 states that the Eastman Kodak Company announced the election of Charles K. Flint as vice-president. He is a native of Stoughton, Mass., and had been general manager of the Kodak Park works since 1936.

We record with regret two deaths, that of George A. Clark, Medford, Mass., on June 30; and that of Carleton Warren, Natick, Mass., on July 31. We have no further information about George Clark except that he was a construction engineer. Carleton Warren was formerly engineer and later machine shop manager for the Richard Connolly Steel Company in Pittsburgh. He had operated a machine shop in Natick since 1920. — GUY C. PETERSON, *Secretary*, 788 Riverside Drive, New York, N.Y. — THEODORE H. TAFT, *Assistant Secretary*, Room 3-266, M.I.T., Cambridge, Mass.

1902

Charles E. McCarthy is now a colonel in the 44th Infantry Division at Fort Dix, N.J. — Mrs. Rufus M. Whittet announced the engagement of her daughter, Helen Isabella, to Seymour Whiting Ely of Hartford, Conn. — Word has been received of the death on October 1 of Henry Glover Allbright, Jr., at Tiburon, Calif., where he had lived for many years.

The new Building 24 at Technology is being built by Sawyer's concern, the Sawyer Construction Company, which is also busy in defense work on the construction of the "lighter than air" base at South Weymouth, where a five-and-a-half-million-dollar project is under way. — BURTON G. PHILBRICK, *Secretary*, 246 Stuart Street, Boston, Mass.

1903

George Greene, our Class Agent, did an excellent job for the 1940–1941 Alumni Fund. Eighty-four members of the Class contributed, which is about 29 per cent of the known membership. Let's try to increase the total for the 1941–1942 Fund.

William Braden '92 sent us the following account of the life of Thomas Moore Hamilton, III, who died in California on September 5 at the age of 68: "He was born at Helena, Mont. . . . He rode the range with Charles Russell, the cowboy artist. In 1885, Hamilton came into the laboratory of Braden Brothers, in Helena, to learn assaying, and then he decided to get an engineering education. He attended the Rensselaer Polytechnic Institute at Troy, N.Y., for one year and then spent three years at Technology in a mining course. During vacations, he was occupied in field work in the United States, Canada and Mexico. . . ."

From 1904 to 1918, Hamilton was a mining engineer in South America. "In 1922, he married Marguerite C. Cross of Lewistown, Mont., who, with their son, Thomas, survives him.

"In 1930, Hamilton accompanied William Braden to South America, examining mining resources in Brazil and Peru for two years. Returning to Los Angeles, he continued to examine mines for clients in southwestern United States and Mexico. From 1936 to the time of his death, he was associated with Braden in exploration work throughout western United States.

"Tom was a Mason, an active Rotarian, a member of the Los Angeles Chamber of Commerce, the Mining Association of the Southwest, the American Institute of Mining and Metallurgical Engineers, the Alumni Association of the M.I.T., and the Chi Phi Fraternity. His many friends valued his wide experience, sound counsel, and ready sympathy." — FREDERIC A. EUSTIS, *Secretary*, 131 State Street, Boston, Mass. JAMES A. CUSHMAN, *Assistant Secretary*, 441 Stuart Street, Boston, Mass.

1907

Through the co-operation of Carl Trauerman, I have some information regarding Ralph G. Kann, II, who left the Institute prior to 1907. He lives on Graham Hill Road, Santa Cruz, Calif., and carries on his business from the same address. On October 20, Carl wrote me: "My wife and I spent a day with Kann in his beautiful home. Ralph is practically retired, but he operates a company known as the Model Structures Company, which is rather lucrative as he has spent a lot of time and money in building it up. I have known Ralph since grammar-school days, and he had a hobby of constructing models and painting. He has developed this hobby into a commercial business of making models of buildings, bridges, trains, and so on. He sells the parts in kits, each kit being accompanied by a blueprint and directions for assembling. Each model is accurately scaled. He is doing a nice piece of work and enjoys it immensely. He has three children — two girls and a boy. The boy is in the cattle business, one girl is married, and the other is in college."

I am mighty happy to report that at the time we wrote these notes, Harold Wonson, our Class Treasurer and Assistant Secretary, was apparently on the road to recovery from his long illness. It was late in September, 1940, that he had a severe heart attack, and during all of last fall, winter, spring, and summer he was afflicted with one form of sickness after another. Continuously away from his business, almost constantly confined to his bed, many weeks in the hospital, at intervals, and often very dangerously ill, he is fortunate to be alive. On October 7 he wrote me from his office regarding class matters, and also said: "I seem to be coming along reasonably well, although I am still absorbing flocks of pills and huge quantities of liquids in an endeavor to eliminate the streptococcal infection which gave me so much trouble last summer and of which there is still a trace. I am still working on a somewhat restricted schedule, as I usually start work about an hour late and leave the office about a half hour early. I am now allowed to drive my car back and forth to the office. I have yet to make my first trip to Boston since my illness [some twenty miles from Whitman, Mass., where his business is located], and I have yet to go out in the evening. I am very much in hopes that well before our class-reunion time rolls around I shall be in good shape to take a reasonably active part at Oyster Harbors."

In just about six months from the time you receive this Review, our thirty-fifth-year gathering will be taking place. June 5 to 8, 1942, are the dates; Osterville, Mass., at the beautiful Oyster Harbors Club, the place. Make your plans to be present.

Octavus Peabody and his wife have left the apartment in Boston where they have lived for many years, and have bought a house at 25 Abbott Road, Dedham, Mass. Harry Moody has moved from Scarsdale, N.Y., to Larchmont Acres Apartments, Richbell House, Larchmont, N.Y. — Cecil F. Baker is at 1178 Virginia Avenue, Columbus, Ohio.

A letter from our classmate Birendra C. Gupta, Burnpur, via Asansol, East India Railway, Bengal, India, dated July 25, arrived exactly three months after he wrote it: ". . . We in India have no ocular demonstrations of what is going on in the war zones. In the United States, I presume that every factory in every town and village is working at high pressure to produce the wherewithal for the triumph of democracy. India has so far not been able to show very much of the output that its vast resources in man

1907 Continued

power and raw materials would indicate. Large numbers of committees have been sitting and talking, but only a few among the Europeans or Indians have clear-cut ideas as to what India's effort should be. A growing section in England is anxious to see India become equal partner with the self-governing dominions, but a large number of die-hards are still left who are very reluctant to let India come out of her state of lethargy and become an industrial country. These men still wish India to fill the roles of 'hewers of wood and drawers of water' and her effort to be confined to the production of raw materials only. The people of India have made such progress from within, however, that they no longer are satisfied with this condition and are demanding, quite naturally, to have an adequate share in the administration of their own affairs. The result is encouraging. The first shipyard shot out her first vessel about a month ago, and an airplane factory is under contemplation and should materialize in the near future. We have now two very big steel works in India which, if properly expanded, should be able to supply at least one-fourth of the civilian needs of the country. They are both making tremendous war efforts and are actually producing shell and armor-plate steel. Her unlimited supply of the highest quality of iron ore, coking coal, dolomite, bauxite, manganese, and so on, should in course of time make this country industrially self-sufficient.

"As for food stuffs, we have an unlimited supply for the requirements of this country. Certain districts, of course, because of natural causes such as drought, flood, and so on, suffer from time to time from famine, but other parts of India can always supply the shortage, and the government's efforts are daily on the increase to meet such adverse conditions.

"My three years' connection with the Indian Iron and Steel Company [Gupta is the head of that company.] has been a very happy one. My contract takes me over another two years, after which I shall retire from active business life. I am extremely fit still and never miss my game of tennis, generally four sets, unless weather conditions or duties make me do so. We have been thinking of a trip around the world for a long time, but the conditions for a good many years after the war will be such that travel will be robbed of its enjoyment and comforts.

"In October, 1940, my wife and I took a trip to southern India. It was one of the most enjoyable tours we have ever indulged in, and I learned a great deal about my own country. . . ." An article on their travels had been published in the Burn-Martin magazine. The second was due to be published early in August. — BRYANT NICHOLS, *Secretary*, 126 Charles Street, Auburndale, Mass. HAROLD S. WONSON, *Assistant Secretary*, Commonwealth Shoe and Leather Company, Whitman, Mass.

1909

News for this month centers on Bradford W. Shaw, Chick's son, whose marriage to Barbara Arlene Josephine Rogers on October 12 was recently announced by Barbara's parents. — CHARLES R. MAIN, *Secretary*, 201 Devonshire Street, Boston, Mass. *Assistant Secretaries:* PAUL M. WISWALL, MAURICE R. SCHARFF, New York; GEORGE E. WALLIS, Chicago.

1911

Fate has dealt two of our classmates and their families cruel blows this fall in the accidental deaths of William C. Warner, 28, son of Mr. and Mrs. W. W. Warner of Nowata, Okla., and John Scoville, 16, son of Mr. and Mrs. John H. Scoville of West Hartford, Conn.

Young Bill Warner was a lieutenant in the Army Air Corps and lost his life in the crash of an army bomber off Diamond Head, Hawaii, on September 29. Young John Scoville was thrown sixty feet and fatally injured when the automobile he was driving overturned on Mountain Road, Hartford, on October 16. Our hearts go out to the parents, to whom your Secretary has expressed deep sympathy.

It was my pleasure to participate in the sixteenth annual Technology Christian Association freshman camp at Camp Massapoag in Dunstable during the last week end in September. On that Monday night, while attending the freshman smoker at Walker Memorial, I was greeted by Frieda Omansky, daughter of Morris Omansky, V. She is a freshman studying architecture at the Institute this year.

I had a breezy call from Burleigh Cheney, II, president and general manager of Barrington Steam Brick Company, Barrington, R.I., the following day. He expressed extreme regret that business had forced him to be away at the time of our reunion. In addition to his regular duties, he is doing some government work on priorities for his industry.

It must have been a real relief to Bunnie Wilson, XIV, to have the Aluminum Company of America, of which he is vice-president, absolved of monopoly charges made by the government. We're very happy for you, Bun.

We are indebted to Harry Tisdale, V, for a clipping from a September issue of the New York *Daily News*, entitled: "From Idea to Bomber, Wright Field Decides What Air Corps Needs." The article, featuring the work of our own Heinie Kenney, I, states that "Wright Field is the focus of all the activities of the materiel division, which division decides just what the Air Corps wants. . . .

"Supervising the dozen or more special sections into which this usually overlooked national headquarters of plane production is subdivided is a specialist who bears the title of assistant chief of the materiel division. He is Brig. Gen. George C. Kenney, the driving power behind Wright Field. . . . Kenney came to Dayton last winter fresh from an observation tour abroad. He brought with him a lot of ideas about self-sealing gas tanks, armor-plated cockpits and increased firepower, which Wright Field has since put into effect."

Those of us who were fortunate enough to hear Heinie at the thirty-year reunion, when he described his recent European observation tour, realize his real value to the Army Air Corps, and I'm sure the whole Class is proud of him.

Less than a week before the $13,000,000 Fall River rubber plant fire in early October, Carl Richmond, I, a major now stationed in the office of the Undersecretary of War, had requested a survey of the possible fire hazard, realizing the dangers involved. The National Fire Protection Association reported just before the conflagration that the quantity of rubber stored there constituted a serious fire hazard, but the calamity occurred before remedial steps could be taken.

Evidently my admonition asking increased support for the 1941–1942 Alumni Fund has borne fruit, but there are still some of last year's subscribers who have as yet failed to send in renewals for the current year, and this shouldn't be!

Aleck Yereance, I, has moved from Ashland, Mass., to 984 Memorial Drive, Cambridge. He it was whose eagle eye caught the item about the Scoville death in the Hartford *Courant* and sent the clipping to me. — I hope that more of you will "Write to Dennie." — ORVILLE B. DENISON, *Secretary*, Chamber of Commerce, Worcester, Mass. JOHN A. HERLIHY, *Assistant Secretary*, 588 Riverside Avenue, Medford, Mass.

1912

Your Secretary and Assistant Secretary wish you and yours a very Merry Christmas. — The following letter was received from B. H. Morash, VI, who is with the United-Carr Fastener Company of Canada, Ltd., in Toronto: ". . . Alberto de Romana '11, whom I knew quite intimately at Schenectady, recently returned to the United States on business. He made the trip from Buffalo to Toronto to see me, and I, of course, *would* be in the North on a holiday. . . .

"I drove two friends from Philadelphia to Callender, Ont., to see the Dionne quintuplets. From there we went to Ottawa, where we enjoyed a personally conducted tour through the houses of Parliament. — We are very busy with war work. As you know, our business is metal stampings, and we have all we can take care of, working pretty well round the clock. . . ." — FREDERICK J. SHEPARD, JR., *Secretary*, 125 Walnut Street, Watertown, Mass. DAVID J. MCGRATH, *Assistant Secretary*, McGraw-Hill Publishing Company, Inc., 330 West 42d Street, New York, N.Y.

1913

The following article came from the Boston *Herald* of July 26: "If Charles Edison, who resigned as Assistant Secretary of the Navy to become Governor of New Jersey, were in training for a presidential nomination at the Democratic National Convention in 1944, he could not have a better site for headquarters or a more helpful adversary. His bitter scraps with Democratic Mayor Frank Hague have had national attention. . . .

1913 Continued

Like Governor Woodrow Wilson, Governor Charles Edison is likely to be in the spotlight constantly. . . . Fighting him, [Hague] defeating him and perhaps unseating him somehow, Governor Edison would become one of the glamorous figures of the party, the state and the nation. Just now it looks as if he had won most of the rounds in his unlimited-round fight with the Big Boss. As Mr. Edison is in middle life, a graduate of M.I.T. and widely respected in his party, he may go to the next convention with a large block of delegates."

Arthur Hirst V, is located in Pawtucket, R.I., selling chemicals to the textile mills for the Standard Chemical Company of New Jersey. — Arthur Townsend writes: "George Starr, I, dropped into the office the other day for a brief chat. George has his headquarters in New York City and is a traveling representative of the Portland Cement Association. He says the work is extremely interesting and that the job is a most attractive one." — FREDERICK D. MURDOCK, *Secretary*, Murdock Webbing Company, Box 784, Pawtucket, R.I.

1914

With keen regret we report a serious accident to Charles Shaw, Commander in the Coast and Geodetic Survey. Shaw was in the Philippines and, while on a sightseeing trip to the city of Jolo, was stabbed nine times without warning by a native who was a member of the juramentado sect, members of which take an oath to die while killing Christians. The assassin was shot by a local policeman. The stabbing took place early in October, and the Army flew medical aid to Shaw. We have no further report.

Arthur Petts, who was previously located in Boston, has joined the International Engineering Works, Inc., of Framingham, Mass. — In addition to running the Benjamin Chase Company at Derry, N.H., Malcolm MacKenzie also finds time to serve in quasi-public enterprises. A recent activity of his is that of the treasurership of the New Hampshire Manufacturers Association.

On October 20, Herman Affel spoke at the Engineering Societies Building in New York. The subject was "Functions of Filters and Other Networks." — H. B. RICHMOND, *Secretary*, General Radio Company, 30 State Street, Cambridge, Mass. CHARLES P. FISKE, *Assistant Secretary*, 1775 Broadway, New York, N.Y.

1915

Help! *Help!!* Pay your class dues and *really* help Azel. — Our own Frank Scully has been in the political limelight in Cambridge under the new Plan E recently adopted there. — Mr. and Mrs. James Benson Neal of Lockport, N.Y., announce the marriage of their daughter, Barbara, to Quentin S. Dearman on October 25. This is Ben's charming daughter whom I met last summer. To the young couple go the best wishes of the Class.

Stanley Baxter was married to Mildred B. Burns on September 27 in Williamstown, Mass., and is at home at Stone-Fold, Middlesex Turnpike, Burlington, Mass. Our congratulations to Stanley. This leaves only a few of us bachelors now in circulation. Who's next?

Mary Plummer Rice, after coming to our New York dinner and then being refused admission, was jolly enough to write this splendid letter: "Your note and the enclosure were well worth the trip to New York, and I enjoyed the whole episode immensely. It was worth the lockout to receive such a memorable document, and no one ever cheered me before! Next time I will know enough not to go to a Technology Club affair. . . . Did I tell you about my new granddaughter, nine months old? She flew from San Francisco to visit me. It will be hard to give her up, for she is such a gay, friendly baby. Do tell Wayne Bradley that I have eight children now, and see if he will believe it.

"I was locked out of military drill at M.I.T. but am more than making up for it now. It is much easier to become a second lieutenant in the Motor Corps than in the Army, and much more fun. I have a shrill whistle and can give the commands in a not-too-squeaky voice. I'll wear my uniform to the luncheon you promised me. We have learned to drive an ambulance, have taken a motor mechanics course, and practiced stretcher-carrying for a year. Westchester County is a vulnerable spot in case of war, as it is the only land exit from New York City. Best regards to all the cosigners of my greetings."

Congratulations go to Bill Smith, I, who has just been promoted to the rank of captain and will be in complete charge of all building operations at the Brooklyn Navy Yard. Nice going, Bill!

At the Atlantic City meeting of the American Public Health Association in October, Dr. Stanley H. Osborn of our Class was chosen a councilor. — M. F. Coolbaugh, president of the Colorado School of Mines, has beenre appointed to the Colorado State Mineral Resources Board. — I had a pleasant visit and lunch with John Homan in Beverly recently. He is director of mechanical research and development at the United Shoe Machinery Corporation there. John hasn't changed any in years.

A friend of mine recently visiting in Mexico City met Ken Boynton and had a very pleasant visit with him and his family, and Ken wrote me about it. I think Ken won the official long-distance prize at the reunion for his loyalty in coming all the way from Mexico City.

At a recent Boston meeting of the Associated Industries of Massachusetts, our Class was well represented by Reg Foster, Weare Howlett, Frank Scully, Ercell Teeson, and Max Woythaler. Almost a '15 reunion. — Remember to pay your class dues and really help Azel! — AZEL W. MACK, *Secretary*, 40 St. Paul Street, Brookline, Mass.

1916

We know now why I. B. McDaniel was unable to attend the reunion. He is located in Venezuela on a government mission and probably will be there for another two years. Classmates contemplating a Caribbean trip may secure I.B.'s address from the Secretary.

George Allen, who was one of the 115 classmates who enjoyed our reunion at Oyster Harbors Club at Cape Cod, has been transferred from Camden, N.J., to Bloomington, Ind., where his address is 710 East First Street. Dave Patten wrote to George about his new assignment: "I haven't the slightest idea what that Blooming Town in-diana can hold in the way of attraction for you. However, it was thoughtful of you to send along the new address, and I shall record it in the class history. . . . I saw Ralph Fletcher recently, still on his twelve-month vacation. Rusty White is now assistant to the chief of the New England Aircraft School. He flies to Washington every so often to present his theories."

Walt Binger breaks into the news again in the New York *Herald Tribune*, Sunday, October 5. He is coauthor of "What the Citizen Should Know About Civilian Defense."

In a roundabout way we have heard again from our classmate, Ralph Alfaro-Moran, whom we all missed so much at the reunion. I quote from a letter from Chuck Loomis: "Some two weeks ago I had a letter from Rafael Alfaro, with whom I roomed part of my senior year and with whom I went to war. He turned up in San Francisco again, this time to see his daughter being graduated from high school there. He also has a son at one of the various branches of the University of California. He came to Memphis a few days later and spent four or five days with me. Aside from growing older like the rest of us, he has changed but little. We were able to start in where we left off on his visit four years ago. I understand he expects to return to San Salvador in a few weeks. . . . He is in the coffee processing and exporting business in Salvador."

Jeff Gfroerer's business seems to be making headway. He is manufacturing a popular-priced machine, known as the Sound Scriber, for recording dictation and conference conversations. Hen Shepard writes me that he has purchased one of these and finds it a very useful gadget.

Bill Drummey, a school architect in Boston, has just been sworn in as state director of the division of public work reserve of the W.P.A. The work to which he is assigned is designed to set up a six-year program of public works projects to absorb labor after the national defense expansion program has ended. — JAMES A. BURBANK, *Secretary*, Travelers Insurance Company, Hartford, Conn. STEVEN R. BERKE, *Associate Secretary*, Coleman Brothers Corporation, 245 State Street, Boston, Mass.

1917

The following letter from Win McNeill is a preliminary report on the twenty-fifth reunion: "The reunion committee, which last year's Alumni Day group so unceremoniously elected, has given considerable thought to the question of a

1917 Continued

proper meeting place for our reunion next year. Our committee has decided on the Hotel Griswold, Eastern Point, New London, Conn.

"The hotel literature tells us that this is a delightful spot overlooking Long Island Sound, with an eighteen-hole golf course, swimming pool, and facilities for tennis, yachting, deep sea fishing, riding, and croquet. The Griswold is convenient for persons residing in New York (127 miles), Providence (62 miles), Hartford (44 miles), and Boston (105 miles). Two miles from the Griswold is an airplane landing field.

"A personal visit confirmed the opinion of others that the Griswold is ideally suited for a class reunion. Rates for single rooms will be $8.00 a day for each person, including meals, and for double rooms, $7.50 a person.

"What kind of a gift shall the Class make to the Institute in celebration of its twenty-fifth anniversary? Let's have a lot of fan mail from every one in the Class, loaded with ideas for the committee, so that our twenty-fifth can be made a reunion full of good-fellowship and interest." — Win's address is Colgate-Palmolive-Peet Company, 105 Hudson Street, Jersey City, N.J.

E. P. Brooks is chairman of the industrial division of the Chicago Community Fund campaign. Under his direction, pledge cards have recently been passed out by fifty thousand volunteers.

The following is from the column "Who's News This Week" in the Dover *Delaware Republican:* "Just a year ago Roger L. Putnam, go-getting mayor of Springfield, Mass., was much in the news with the Putnam plan to break bottlenecks in industry. He caught the nation's attention by his success in achieving cooperation between the city, industry, and labor, the most important detail being the training of labor by the city, to fit specific needs. He's in the news as Springfield's defense director with some snappy suggestions about the swift and effective integration of civilians and officials, and private and public facilities. His successful battles with two floods and a hurricane give weight to his words."

Ed Aldrin is manager of the recently re-opened Newark Airport. He is a lieutenant colonel in the Air Corps Reserve and is living in Montclair, N.J.

Irving McDaniel, recently promoted to the rank of captain in the Construction Corps of the Navy, is chief of the naval mission sent to Venezuela and is at present living in Puerto Cabello, engaged with the naval aspects of cultivating the good neighbor policy in that part of Latin America.

The following changes of address have been reported by the Register of Former Students: Charles T. Barnard to Great Atlantic and Pacific Tea Company, Room 1016 Grant Building, Pittsburgh, Pa.; Frank L. Butterworth to 927 Ontario Street, Oak Park, Ill.; Joseph J. Clarkson to 126 Trivista Right, Hot Springs, Ark.; Captain Frederick G Crisp to Navy Yard, Mare Island, Calif.; Dr. Ellis B. Soble to 152 Barrington Street, Rochester, N.Y.; Commander William A. Sullivan to American Embassy, London, England; and Chandler T. White to 43 Marion Avenue, Albany, N.Y. — RAYMOND STEVENS, *Secretary*, 30 Charles River Road, Cambridge, Mass. PHILIP E. HULBURD, *Assistant Secretary*, Phillips Exeter Academy, Exeter, N.H.

1918

In the July issue last year I told of the graduation of the sons of the Howard twins. It was not until Class Day that I understood the full significance of that day to the family. Frank W. Howard '91, father of the twins, was celebrating his fiftieth anniversary from the Institute.

Those present at the Alumni Dinner were: Theodore Braaten, Jack Hanley, the Howard twins, Tom Kelly, Bill Wills, and your Secretary. F. W. Howard joined us for part of the time, and Polly Thompson '37 was with us also. I hope that we shall have a larger group in 1943.

At the Alumni Dinner some of the boys asked me if I would inquire if the Oyster Harbors Club would be free in June, '43, in case we should decide to go there for our reunion. The Oyster Harbors Club is at Osterville, on the south shore of Cape Cod, a few miles south of the canal. The club had not been reserved by any other Class for the 1943 reunion week end, so I made a temporary reservation. I drove to the club this summer, and I think that it is an ideal place for us to go. Let's begin to plan for the twenty-fifth reunion *now.*

News from Maggie says that about 25 per cent of the money for the class gift has been collected and more has been pledged. Fellows, come on, send your checks so we shall be ready when the time comes. Jack Hanley wrote to Maggie, making a suggestion about the organ fund: "When members of the Class are out to dinner or at a cocktail party, suggest that they refuse the third cocktail and, instead, transfer fifty cents from one pocket to another and then send it to you."

Dick Wilkins wrote: "I enclose herewith a small check for the organ fund, purely in appreciation of the accuracy with which you have delineated the numerous reasons why this or any other appeal for funds should be thrown in the wastebasket at the present time. Possibly a contributing reason for my abnormal generosity is the fact that I have so much music in my soul, as any of our dear classmates who have ever been in range can well attest."

From E. T. Hickman in Lake Wales, Fla., came the following: "Well, here I am — without friends, without funds, and without a future. Utter despair, I calls it. I have been rummaging through my liabilities and potential assets, and to my surprise I found one creditor a mite less contentious than the rest. For that reason I am enclosing a check to cover the lumber for the organ case and for five hamburgers."

From Al Mumford came: "What a summation! Nine horses, six dogs, five cats, and 227 dead men added together make $362.94. I'm so dumb I tried to figure it out, getting dizzier and dizzier until I finally woke up. Must be my English descent. . . . Next year one of my daughters will be a senior at Wellesley and one a freshman at Wellesley or Cornell." — Maggie's daughter was graduated from Wellesley last June. Priscilla received the John Masefield prize for verse writing.

I am glad to see that this year the Class has risen both in the number of members contributing to the Alumni Fund and in amount contributed. In reply to Bill Wills' fund appeal, Yale Evelev of Reading, Pa., wrote: "I was glad to see the personal touch in the postscript of the appeal. I will not forget the next reunion; I am looking forward to it. — The family is getting older and occasionally beat daddy in golf. I hope to be able to have a son at Technology within the next few years. . . . We are pretty busy with defense contracts. The Keystone Engineering Corporation now has active offices in Philadelphia, Reading, and Lebanon. As I take a bird's-eye view of the situation, however, we appear to be just crawling along. With the background of M.I.T. and compared with the really large competitors, we should have offices in Boston, New York, Washington, and San Francisco."

W. B. Engelbrecht wrote from Bartlesville, Okla.: "I am still with the Phillips Petroleum Company, in the aviation department. Last summer I was fortunate enough to be selected as one of the engineers to serve under Robert E. Wilson '16. This committee was organized to advise the Army and Navy on petroleum storage, especially for underground tanks for aviation gasoline. I spent five or six months in Washington, where I met a few of my old Technology friends, but since then I have been home in Oklahoma most of the time."

I received a clipping about G. L. Hancock, saying that "a well-known figure in the financial district of Boston" was about to sever his connection with the securities business, the investment firm of Jackson and Curtis. On March 15 Hancock became mill representative of the plywood division of the Evans Products Company. For thirteen years he has been a member of the board of directors of that company. With his new duties Hancock has charge of the Eastern sales territory covering New England, the Atlantic seaboard to Norfolk, Va., and Washington, D.C., west to Pittsburgh and Buffalo. His headquarters are at 31 State Street, Boston. In some twenty-one years on State Street, Gren has built up a wide acquaintance.

Leaving the Institute in 1917, he entered the air service in the World War, becoming first lieutenant, officer in charge of flying, Post Field, Fort Sill, Okla. A resident of Belmont, Hancock is a member of the warrant committee of the town, a town meeting member, and an officer of the Grand Royal Arch Chapter of Massachusetts.

Bill Wills has come to the front again as the architect for the new development

1918 Continued

in Lexington, Mass., called "Battle Green Village." The Lexington *Minuteman* contained a lengthy description of the houses.

In May, Winthrop E. Nightingale, now a professor at Northeastern University, and a naval aviator during the World War, was made an associate member of the Boston flight-selection board in connection with the naval training base. He has served as Civil Aeronautics Authority co-ordinator for the civilian pilot-training program and is a member of the executive board of a college co-ordinators' organization.

R. Ranney Adams, vice-president in charge of operations of the Grace Line, has been elected executive vice-president of the company and a member of the board of directors. Adams has been in charge of operations since he joined the line in 1929.

Walter J. Henry died at his home in Quincy, Mass., on April 8. He was vice-president of the Boston Gear Works, Inc. Before becoming associated with the works in 1935, he was employed by the General Electric Company at Pittsfield and the Henry and Wright Manufacturing Company at Hartford, Conn.

The New York *Herald Tribune* printed the following about Benjamin Whorf: "Benjamin Lee Whorf, of Weathersfield, Conn., an authority on the ancient Aztec and Mayan civilization died July 27, 1941. Mr. Whorf was assistant secretary of the Hartford Fire Insurance Company.

"He was one of the few living men who had mastered the language and philosophy of the ancient dwellers of Central America, and he was noted as the discoverer of Mexican inscriptions dating earlier than 500 A.D.

"Mr. Whorf began his study of the Aztec and Mayan languages in 1925 as a hobby in the Watkinson Library in Hartford and after five years of spare-time work he went, in 1930, to the Pueblo villages of Central Mexico for a study of the languages of the people as they are spoken today. At the time, he lived in the homes of the descendants of the old civilizations and transcribed folk songs, legends, and poems of the people. It was during this trip on a visit to an ancient temple of Tepoztecatl, that he discovered the inscriptions dating to 500 A.D.

"During his early studies he transcribed the Aztec dictionary as an aid to students. The chief purpose of his studies was not merely to find the physical relics of the early culture but to determine the meaning of those remains. He attempted to do this by studying the spoken languages of the peoples and attempting to link them to messages found on tablets and other relics. Colleges and museums from all parts of the country sent material to Mr. Whorf for translation.

"He was named an honorary fellow at Yale University in 1926 and received the Sterling Fellowship from Yale in 1937. In the same year he was elected a faculty and research fellow by the Yale Chapter of Sigma Xi, national honorary scientific fraternity." We also have a clipping from a Hartford paper containing an editorial about Ben. — GRETCHEN A. PALMER, *Secretary*, The Thomas School, The Wilson Road, Rowayton, Conn.

1919

Bill Banks was in New York early in October, and your Secretary had an enjoyable visit with him at lunch in the oyster bar at Grand Central Terminal. We discussed at some length class get-togethers, reunions, and particularly our twenty-fifth reunion, which is scheduled for 1944. As you all know, it is customary for the twenty-five-year Class to present a gift to the Institute on Class Day in June, and your Secretary suggests that the Class consider the means for carrying out this custom. He would appreciate hearing suggestions as to what the present should be and how it should be financed. He would also appreciate suggestions as to where the reunion should be held.

Bill Banks is chief engineer of the Macallen Company in Boston, Mass., manufacturers of insulation for motors. Bill has three daughters and one boy. His oldest daughter goes to Edgewood Park School, Briarcliff, N.Y. Bill travels to Chicago and Cleveland semiannually and is director of a subsidiary company in Ohio. He sees Bob Hackett occasionally. Bob is vice-president of Nichols and Company, Boston, wool jobbers.

Charlie Tavener '18 dropped in during October. He is prospering as vice-president and general manager of Kaye and MacDonald, Inc., West Orange, N.J., manufacturers of steam traps. Of their equipment, 87 per cent now goes into defense projects. Charlie lives at 129 Sound Beach Avenue, Old Greenwich, Conn. He has one of the longest commutations that your Secretary knows about. Charlie's daughter, Virginia V., is now in her last year at Stuart Hall, Staunton, Va. His son, Charles H., Jr., is in his last year at Woodberry Forest School, Woodberry Forest, Va., where he is on the football team.

Edward F. Pierce, Jr., died on August 10 after a long illness. According to the Boston *Herald*, he was born in Melrose and was a graduate of the Melrose schools. He was a 32d degree Mason and a Shriner. He was manager of the Washington branch of Nolan and Company. Edward is survived by his widow, the former Barbara Wilder Pierce of Melrose, and two daughters, Pauline and Nancy.

Ray H. Bartlett has moved from West Newton, Mass., to 31 Mountfort Road, Newton Highlands. Walter M. Howlett, XV, has moved from Dobbs Ferry to Matthiessen Park, Irvington-on-Hudson, N.Y.

Horace W. Denison, Stoughton, Mass., wrote: "My family is a small one, consisting of my wife and sixteen-year-old son. My vocation is an effort to engineer better elastic fabrics for ladies' foundation garments and similar items of apparel. As an avocation, I try to be a farmer — with the thought that of necessity farming may be the means of providing a livelihood for myself and family later on.

"My traveling is pretty well limited to occasional business trips to New York, Chicago, and points west, with an annual winter sojourn to Nassau in the Bahamas."

Edward A. Richardson wrote from 1102 Linden Street, Bethlehem, Pa., about certain patents that he has been working on. He said he would drop in to see your Secretary on his next trip to New York. — Myles F. Connors, 129 Meadbrook Road, Garden City, N.Y., is an investment counsel in New York. He has three children — one daughter, twenty, at Swarthmore College, and two sons, sixteen and nine. Myles' hobby is stamp collecting. He travels to Florida in the winter and in the spring. He has recently been in touch with Scott Keith and John Meader.

Joe E. Feinsilver writes from 46 Gardner Road, Brookline, Mass., that he is a certified public accountant. He has a daughter fifteen years old and a son twelve. — Grant D. Green, Jr., is in the chief accounting division of the 2d New York district. He lived in France for eight years. — J. Elliot Cannell writes from 128 Pearl Street, Melrose, Mass., that he is a telephone engineer, has one daughter aged nineteen, and travels to Florida in the spring. Boating is his hobby. Elliot recently got in touch with Warren Maynard.

Andrew A. Cook writes from 150 East Jefferson Street, Pomona, Calif., where he is in the Army at Camp San Luis Obispo. Andrew completed the advanced course at the infantry school at Fort Benning, Ga.

Harry Cikins writes from 88 Millet Street, Dorchester, Mass., where he is a life insurance underwriter. He has three boys, one of whom entered Harvard University this fall. Harry's hobbies are bowling and baseball.

Bernard S. Coleman writes from 87 Vassar Avenue, Newark, N.J., where he is doing public health work. He was recently elected treasurer of the Weequahic Adult School in Newark, N.J. Bernard traveled to Florida in August and visited the Smokies in September. His hobbies are music and philately. He has two boys, fifteen and twelve years old.

Dugald W. Campbell lives at 3585 Ocean Front Walk, San Diego, Calif. He is with the San Diego Chamber of Commerce. He has a wife and three children and utilizes his spare time sailing and in photography.

Elisabeth Coit, 123 East 54th Street, New York City, writes that her work is in architecture — houses, restaurants, and so on. She has been busy writing a book and doing reviews for the *Architectural Record*. Last summer she gave a series of radio talks about building. Her hobby is working with water colors and flying in light planes. She has seen Dave Sanford recently.

John T. Cosgrove is a town engineer in Lexington, Mass., and lives at 9 Tower Road. He has four-year-old twin daughters, travels in New England and Canada, and indulges in hunting and fishing for recreation. He ran into Bill Bennett in Medford recently.

1919 Continued

Frank J. Coyne is treasurer of the Sterling Fibre Company in Waltham, Mass. He has an old house in New Hampshire where he vacations. He recently met Otto Muller and Max Untersee.

John E. Cassidy is a patent attorney for the Bell Telephone Laboratories and lives at 17 Brook Bridge Road, Great Neck, L.I. He has a son, Kenneth, eleven years old. John has traveled in all parts of the United States and Buenos Aires, on business, and goes to Miami, Fla., in the winter, when he can get away.

Henry S. Derby is a major in the 71st Field Artillery Brigade at Fort Ethan Allen, Vt., where he is intelligence officer in Brigade S-2. He took part in army maneuvers in North and South Carolina and expected to return to Vermont in December. He just completed the field officers' course at the field artillery school at Fort Sill, Okla.

Oscar de Lima is kept busy as president of the Roger Smith Hotels Corporation and running the Hotel Nacional in Havana, Cuba. Buzz often travels on business. He lives at 55 River Street, Stamford, Conn., and he spends his spare time with his friends and classmates, whom he says he sees too rarely.

Johnny Coldwell is in the business of manufacturing elastic web, lives at 434 Rochester Street, Fall River, Mass., and has a son, seventeen, and a daughter, fifteen. He spends his spare time duck hunting and surf casting. He has recently seen George McCreery.

Nelson Bond has moved from Tarrytown, N.Y., to West 11th Street, Greenwich. His son entered Williams College this year for a five-year course in which the first three years are spent at Williams and the last two at Technology.

Your Secretary has traveled considerably the past few months in Louisiana, Texas, and California. In Los Angeles, he spent a pleasant evening with Maurice Spaulding '16, who is one of the outstanding architects on the coast, and with Charles Toll, Jr., '23, sales manager for Western Pipe and Steel Company.

Your Secretary read a paper on "Higher Octane Gasoline and the Polyform and Gas Reversion Processes" at the Western Petroleum Refiners Association meeting in Shreveport, La., on October 17 and another paper at the California Natural Gas Association meeting in Los Angeles on October 31. — He wishes to thank the Class for its splendid co-operation in sending news for this column. — EUGENE R. SMOLEY, *Secretary*, Lummus Company, 420 Lexington Avenue, New York, N.Y. GEORGE W. MCCREERY, *Assistant Secretary*, 131 Clarendon Street, Boston, Mass.

1920

We have received notice of the marriage of Huntley Burr to Kathryn McCosker of Brooklyn, N.Y. According to last reports, Burr's address is 88 Monroe Street, Brooklyn, where I am sure he would be glad to receive the congratulations of friends and classmates.

Clarence Thayer '23 of the Technology Club of South Florida forwards an interesting clipping from the Miami *News* showing a handsome new beach apartment engineered by Zurwelle-Whitaker, Inc., the Zurwelle being none other than our own Fred.

Jim Scott is a member of the firm of Scott and Springfellow, Richmond, Va. George Walmsley's present address is 514 Seventh Street, Baytown, Texas. John Tunis has left Lexington, Ky., and is now in New York City. His address is Post Office Box 270, Grand Central Annex.

Perk Bugbee has just returned from a trip to Reno, but we hasten to add that he was out there to make a speech on fire prevention. He also took a swing around the Pacific Coast and had a visit with Woody Wilson, who is still with the Pacific Telephone and Telegraph Company in Seattle. Perk says that Woody hasn't changed any more than you would expect in twenty years.

Ed Ryer has been doing such a good job of following up you fellows for the glory of the Class in relation to the Alumni Fund that there is little I can add to his exhortations, except to say that it will be mighty pleasant to see '20 well up the list when the day of reckoning comes.

While attending a meeting of the Technology Club of Rhode Island, your Secretary had the pleasure of a nice visit with Ev Freeman and learned that Ev is the newly elected president of the Providence Engineering Society. Despite the extra cares and duties of his work with defense-ridden Brown and Sharpe Manufacturing Company, Ev continues to look hale and hearty, and we assume that married life agrees with him. — HAROLD BUGBEE, *Secretary*, 7 Dartmouth Street, Winchester, Mass.

1921

Elliott B. Roberts, I, is in his third year of an extensive survey of the Aleutian Islands and Alaskan waters, as an engineer with the United States Coast and Geodetic Survey. A letter from him, postmarked Dutch Harbor, Alaska, reads: "My doings since leaving the Boston station over two years ago have been quite routine. I spent two summers in the Aleutian Islands — with the temperature ranging in the low fifties, heavy rain and fog, and gales blowing steadily — interspersed with two winter seasons in Seattle as inspector on new ship construction and one on special duty developing a couple of newly invented instruments for oceanographic and hydrographic work.

"The Aleutians consist of little but volcanic peaks, some active, sticking up out of the sea. A more bleak and inhospitable prospect one seldom sees. I spent my first summer on the south coast of Unalaska Island and saw vessels, other than of our own crew, on but two occasions in five months. No people live there. The peaks on that island reach about five thousand feet, and more broken and abrupt topography one can find in but few places on earth. The coast I was surveying is practically all cliff, in places fifteen hundred feet sheer from the water. Last summer I was among and beyond the Islands of Four Mountains and am now en route to a westward continuation of that work toward Amlia Island. . . . Last year I was navigator. This year I am executive officer and glad, indeed, to let some one else worry about the navigation around those islands.

"There are several reasons why the charting of these regions is so important, not the least of which is the military situation. On June 6 to 8, I was out battling the gales where much of the weather of North America has its beginnings. I was thinking of you and hope you turned one up for me." Elliott's mailing address is 601 Federal Building, Seattle, Wash.

Ernest R. Gordon, XII, has gone to Africa, according to a note received from Charlie Locke '96, Alumni Secretary. Ernie has accepted the position of general manager for Gold Coast Banket Areas, Ltd., Tarkwa, Gold Coast Colony, West Africa, where he will be temporarily located, later transferring to general manager of South Banket Areas, Ltd., at Tarkwa, an affiliated company.

Ernie has been associated with the Amparo Mining Company, Etzatlan, Jalisco, Mexico, since 1930, when he was employed as mine superintendent at Piedra Bola. The following year he was named general superintendent of operations at Guanajuato, holding that post until 1936 when he was made local manager at Durango, Colo. Later he was placed in charge of exploration work in the United States, and in 1919 was transferred to Mexico, where he has since held the position of assistant general manager of the company and its Mexican subsidiaries.

Following graduation from the Institute, Ernie obtained a master's degree at the University of Arizona in 1922. From 1923 to 1930 he was employed by several mining companies in Mexico.

Hugh E. McKinstry, XII, geologist and professor of geology at the University of Wisconsin, Madison, Wis., recently spent some time in the Coeur d'Alene district studying geological conditions at the Sunshine Consolidated property on Big Creek.

Victor O. Homerberg, X and III, was honored by the Philadelphia College of Pharmacy and Science last June 4 in being awarded the honorary degree of doctor of science. Vic received his doctorate from the Institute in 1927 and is now Professor of Physical Metallurgy at Technology when he isn't on extensive travels in connection with a number of defense problems.

Howard F. MacMillin, II, president and general manager of the Hydraulic Press Manufacturing Company, Mount Gilead, Ohio, was the guest of honor at a testimonial dinner held recently in the Hotel Harding, Marion, Ohio, by a group of thirty of his close business associates. Howard was presented with an appropriately inscribed watch and chain as a memento of the occasion.

David Farrand, son of our own Ed Farrand, is hereby tendered apologies for the reference to Don Farrand as the stalwart mate of the fishing expedition during

1921 Continued

our reunion. It was David who caught the bucket of fish which he later presented to the chef of the Griswold.

Dugald C. Jackson, Jr., VI-A, head of the department of electrical engineering at the University of Notre Dame, South Bend, Ind., has been called to active duty as a major in the Ordnance Reserve, United States Army. Dugie's address is Frankford Arsenal, Bridesburg Station, Philadelphia, Pa.

William C. Wade, XIII-A, has been promoted to the rank of commander and assigned to the industrial department, United States Navy Yard, Philadelphia, Pa.

The following changes of address have been received: Dr. Flemmon P. Hall, V, R. D. No. 2, Navarino, Syracuse, N.Y.; Walter W. Kittredge, I, 244 Ridgewood Avenue, Hamden, Conn.; Mrs. Donald K. Luke, VII, (Hildegard E. Merriam), Sunnyside Lane, Irvington, N.Y.; and A. Royal Wood, VI-A, 177 Ridgewood Avenue, Hamden, Conn. — A very Merry Christmas and the happiest of New Years to you all. — RAYMOND A. ST.LAURENT, *Secretary*, Rogers Paper Manufacturing Company, Manchester, Conn. CAROLE A. CLARKE, *Assistant Secretary*, International Telephone and Radio Manufacturing Corporation, 137 Varick Street, New York, N.Y.

1922

Alumni Day activities in June were attended by thirty-five members of our Class. Of the twenty registered at the informal reunion at the Kenmore Hotel on Sunday, five played golf in the afternoon and thirteen remained for the class dinner in the evening. On Alumni Day only five classmates were seen at the symposium. Appetites were good, however, because seventeen were on hand for lunch in Du Pont Court. The stein banquet attracted twenty-six and, needless to say, a swell time was enjoyed by all. Our class attendance is increasing every year, but it is usually the same old gang which enjoys Alumni Day so much that they come back every year.

The long-distance record goes to Ed Ash from Detroit, who was at the Kenmore on Sunday although business prevented him from staying for the activities on Monday. A post card to the Secretary will bring a list of those who attended the various Alumni Day functions.

We have received word from Wesley Memorial Hospital, Chicago, Ill., that George W. Potter, treasurer of Hewes and Potter, Inc., Boston, Mass., suffered an illness early in October while on a business trip to Chicago and expected to be confined to the hospital there until late in November.

The Army and Navy continue to call members of our Class into active service. We have learned that A. F. Erikson, who lives in Reading, Mass., and works with Wyckoff Drawn Steel Company in Boston, left for Camp Edwards last summer to join the 68th Coast Artillery. We wish Erikson the best of luck doing his sojourn in the Army and hope he will keep The Review posted on his whereabouts.

Dale Spoor, formerly in New York with the Air Reduction Sales Company, has transferred to St. Louis, Mo., to manage the St. Louis district. His predecessor has been called to active service, and Dale expects this work will keep him in the Middle West until the emergency is over. He is living at 8045 Crescent Drive, Clayton, Mo.

During your Secretary's business ramblings this summer, he encountered several classmates: King Crofton in Rochester, N.Y., has his chest stuck way out because his son, Albert, three and a half years old, has a baby sister, Margaret, born in May.

Ken Coachman makes Schenectady his home and headquarters for the Taylor Instrument Company business in eastern New York State. He has two absorbing hobbies, in which his family also participate. — In their sailboat, they take part in many of the regattas on the fresh-water lakes in central and upper New York. And in the thriving archery club which Ken organized, he shoots with his customary scientific accuracy. He has two children, Lawrence, twelve, who is attending Valley Forge Military Academy in Pennsylvania, and Martha, eleven.

In Adams, Mass., Walter Lennon, superintendent of the L. L. Brown Paper Company, has his hands full to meet the demands placed upon his company for high-grade ledger, photographic, and bond paper. He says he is so busy that he can get in only an occasional game of golf. Walter has somehow managed to elude the fair sex and appears very happy and contented in his bachelorhood.

Bob Tonon and his wife refused to be perturbed or disturbed when several families descended on them at once for a week end at their summer place at Duxbury, Mass. The three Tonon children — Ann, ten, Tina, six, and Cathy, two — were not outdone by their parents in providing amusement for the visiting children. Frank and Mrs. Kurtz came with their two boys, Frank Mason, nine, and Dick, seven. Frank is vice-president of the American Coffee Corporation and likes to get back to sample New England atmosphere and hospitality between trips to South America. John and Mrs. Strieder brought with them two-year-old Allison but did not bring Helen, who was born in November, 1940. Dr. Strieder is rapidly winning an enviable reputation for his specialty, surgery of the chest. Your Secretary, his wife, and Patricia, nine, completed what could almost be called a class reunion. The Tonon hospitality was so enticing that everyone stayed over for an extra day.

The director of the Supply Priorities and Allocations Board reports that Al Browning has gone back to Washington as his special assistant, which evidently means that the affairs of United Wall Paper Factories, of which Al is president, are in good shape so that Al can use his energy and ability in behalf of the defense program in Washington. — CLAYTON D. GROVER, *Secretary*, Whitehead Metal Products Company, Inc., 303 West Tenth Street, New York, N.Y. C. YARDLEY CHITTICK, *Assistant Secretary*, 77 Franklin Street, Boston, Mass.

1923

In April, John C. Flaherty, Captain in the United States Corps of Engineers, sailed for Bermuda, where he is serving as senior civil engineer in the construction of an air base and fortifications.

William E. R. Covell was called back into the service on June 1 for active duty as a lieutenant colonel in the office of the quartermaster general. He had been general manager of the Crossett Watzek Gates Industries in Crossett, Ark. It was as assistant engineer commissioner some years back that Covell achieved notice nationally for his dexterous handling of some local public utility problems.

A. F. Flournoy, patent attorney of Monroe, La., spoke in May to a meeting of the Louisiana section of the American Chemical Society of New Orleans.

Clippings announce the marriage on June 27 of Lester B. Bridaham to Dorothy Odenheimer. The ceremony took place in Hilton Chapel on the campus of the University of Chicago, where both are on the staff of the art institute. Mrs. Bridaham attended the University of Munich and the University of Pittsburgh and was graduated from the University of Chicago. In 1939 she received the Belgian-American Educational Foundation award for study of Flemish and Belgian art, in Brussels. After leaving Technology, Bridaham studied at the Fogg Art Museum at Harvard and at the Students' Art league in New York.

Bill La Londe has been a professor on the staff of the civil engineering department of the Newark College of Engineering since 1929. In June he accepted a commission as a lieutenant in the civil engineering corps of the United States Naval Reserve, and took over a new post at the Brooklyn Navy Yard. He expected to be in the public works office, which is the drafting and designing division of the corps. He was planning to continue to live in Maplewood, N.J.

In July, Norman Weiss, who occupies a responsible position with the American Smelting and Refining Company in Mexico, was back at his parent's home in Brookline for a vacation visit. He was accompanied by his wife and family. — An item for which, like the foregoing, I am indebted to Charles E Locke '96, Alumni Secretary, relates to another Course III man, Pete V. Martin. He has been appointed superintendent of blast furnaces in the world's largest steel mill, the Gary works of the Carnegie-Illinois Steel Corporation, a company with which Pete has been associated for twenty-six years.

He began work as a messenger boy in the Cincinnati office of the company. In 1940, he won the J. E. Johnson, Jr., American Institute of Mechanical Engineers award for a paper embodying the results of research on blast furnace efficiency. — HORATIO L. BOND, *Secretary*, 457 Washington Street, Braintree, Mass. JOHN M. KECK, *Assistant Secretary*, 207 Bloomfield Avenue, Bloomfield, N.J.

1924

The San Francisco News recently carried some interesting anecdotes on the career of Baird Snyder. The principal feature of the article was the contrast between his arrival in San Francisco during the World War and his arrival twenty years later. The first time, he was too young for the Army, so he landed a job as cub surveyor for the Santa Fe Railway Company, living with a construction gang in a converted boxcar. Twenty years later, he arrived as deputy administrator of the national wage and hour division. In the meantime, he had worked his way through Cornell, Yale, and the Institute, was employed in mining construction in South America and Europe, and had become chief engineer for the Farm Security Administration.

Discarding his major's gold oak leaf for the silver one of a lieutenant colonel, Sarkis Zartarian is still attached to the 241st Coast Artillery in the Boston harbor defenses.

The appointment of Tom Rhea as engineer of the new chemical section of the General Electric Company's engineering department was reported in the New York *Herald Tribune* during the summer. Congratulations.

Chick Kane reports that the Alumni Fund, out to better its last year's mark, is progressing well, with '24 at least holding its own with adjoining classes. — FRANCIS A. BARRETT, *General Secretary*, 50 Oliver Street, Boston, Mass.

1925

Your Secretary was able to see or talk on the phone to no less than seven '25 men during his vacation trip to Baltimore and Washington.

I arrived in Baltimore on Tuesday evening, October 7, and after dinner looked up Frank Klein in suburban Towson. My wife and I had a very enjoyable visit with Frank and Connie, who have been in their new home nearly two years now. Frank is with the Glenn L. Martin Company, in charge of the division for testing construction materials, a transfer from the position of assistant chief of laboratories which he held last year.

Mrs. Ware and I arrived in Washington Thursday afternoon. We stopped at the home of Ralph Ilsley and his wife. Since our southern visit was to be brief, I thought it best not to try to see all the '25 men in the city but decided to meet at lunch on Friday some I knew personally. Those who met at the Department of the Interior's cafeteria were Myron Doucette, Ralph Ilsley, Art MacLean, Henry Sachs, Howard Smith, II, and myself.

Ralph Ilsley is at the head of a statistical section in the munitions division of the War Department. Henry Sachs works with him. Art MacLean, who has been in the regular Army for many years and until recently was attached to the U. S. Engineers in charge of improvements on the Cape Cod Canal, is now a captain in the office of the Chief of Engineers. Doucette, who is a reserve officer on active duty in purchasing ordnance supplies, expected to return to New York in a month or two. Smith is a civilian employee of the Navy Department. He designs motors.

I learned that Elliott McDowell is supervisor of industries at the Massachusetts State Prison Colony at Norfolk. (I had to go to Washington to learn what's going on in my own state.) — Chris Harmantas is still with the United States Weather Bureau in Washington. He was to have come to the lunch meeting, but was prevented by the arrival of an important visitor from another office of the bureau.

Myron Doucette was able to get more details concerning the death of Art Ross on September 30, 1940. It appears that on their vacation trip Captain Ross and his wife had taken off for a flight in Art's private plane, when he ran into thick weather. Although his plane was equipped with blind flying instruments, he evidently decided that the best plan was to fly around the area. This took longer than he expected, however, and darkness found him running short of gas. To make matters worse, his lighting generator had broken down. This was discovered from a note written by Art. He headed for an unlighted landing field near Walterboro, S.C., evidently with the idea of attracting attention and having someone place emergency flares. This did not work out, however, so he attempted, on practically his last ounce of gas, to land in the dark. He almost made it, but one wing of the plane struck a pine as he neared the ground, swinging the ship around and causing it to crash wrong side up. Art and his wife were killed instantly. The nearness of his success in this hazardous landing is an indication of his skill as a flyer; he was considered one of the best in the Air Corps.

From the Boston Sunday *Advertiser* of September 14, we learned that Wendell F. Burbank, XV, will be in charge of two courses on automobiles offered by the Evening College of Commerce of Boston University. Wendell is district manager of the Noyes Buick Company of Boston. — HOLLIS F. WARE, *General Secretary*, 3 Aquavia Road, Medford, Mass.

1926

Colin W. Reith has returned from Bahrein Island, Persian Gulf, Iran, where he was with the Bahrein Petroleum Company, and is now with the California Arabian Standard Oil Company in San Francisco. — William B. Millar, New York mining geologist, is in Arizona for a short period of professional work. He may be reached by writing to Box 1943, Globe, Ariz.

A glowing article in the Dallas, Texas, *Times Herald* describes the aggressive group in charge of that city's community fund, among whom is Jack Pew, who is in the oil business. He is reported as a member of the Dallas Petroleum Club, Dallas Athletic Club, Brook Hollow Country Club, and is a director of the First National Bank. — After a long residence in Springfield, Mass., Malcolm MacDuffie has moved to Bernard, Maine. — Magnus Gregersen, who is on the staff of the Columbia University College of Physicians and Surgeons, has had the title of professor added to his name.

On October 5, Mr. and Mrs. William F. Larkin of Brookline announced the engagement of their daughter, Gertrude Ann, to John William Spence. — JAMES R. KILLIAN, JR., *General Secretary*, Room 3-208, M.I.T., Cambridge, Mass.

1930

Congratulations and best wishes are in order this month for four of our classmates. In August, Mary Poole of Lexington, Ky., became the bride of Tuck Arnold, VI. September saw another wedding and two engagements. Lud Jandris, XVII, was married to Cornelia Hurley of Gardner, Mass. Lud and his wife are now in Trinidad in connection with defense construction. The engagements were those of Dave Wells, XV, to Jean Kiley of Boston; and of Fred Trescott, II, to Laura Benedetti of Quincy, Mass. Both Fred and his fiancée are fellow workers of your Secretary at Bethlehem Steel's shipyard in Quincy.

I repeat last month's appeal for news concerning you and any classmates you meet, and for your unanimous support of the Alumni Fund. Both are very greatly needed. — PARKER H. STARRATT, *General Secretary*, 1 Bradley Park Drive, Hingham, Mass.

1932

We have news of the marriage of Ted Heim to Barbara Wiley Eville of Nutley, N.J., on October 11. Mrs. Heim, a graduate of the American Institute of Banking, is on the staff of the Newark Museum. Ted is with the Lambert Pharmacal Company.

Bob Butler wrote from Bethlehem, Pa.: "I went to Colorado last January to work in a mine, where I was mainly concerned with ore reserves and exploration. Now I'm back teaching at Lehigh University. I've no ideas about the reunion, but will try to be there."

From Arlington, Va., Minot Bridgham wrote: "I left the actuarial department of the Metropolitan Life Insurance Company at the end of June for active duty in the railway section office, chief of engineers, where I am handling officer personnel and matters incidental to the reorganization of the military railway service. Shortly after I came on duty, we had an addition to the family, Richard Lee, who, believe it or not, has not interrupted any of my sleep so far.

"Chuck Thayer came to the house recently with his wife and two children. He was relieved from active duty and, when I saw him, was undecided which of the jobs offered him to take."

F. R. Morral moved from Kokomo, Ind., to State College, Pa. He wrote: "I have long been interested in engineering education. While at Purdue University, I took a course on that subject under Andrey Potter '03, dean of engineering. While I was a research metallurgist at the Continental Steel Corporation, I did some teaching in vocational metallurgy and

1932 Continued

gave six engineering defense training courses in three Indiana cities. The change to Pennsylvania State College seemed to follow naturally. Here I expect to do some research in addition to teaching. I read a paper at a meeting of the American Electrochemical Society, Inc., in Chicago in October. I saw more coursemates there than ever before at one time, including E. H. Lyons '31, Ryan '31, and Seyl '33."

George Bisbee wrote: "The last classmate I saw was Cree in Syracuse. At last I have a permanent address, I hope. I've bought a house at 803 Woodsdale Road, Bellevue Manor, Wilmington, Del. Last year I was in the Canal Zone, where there are a number of Technology fellows who have swell get-togethers at the Union Club in Panama City. Homer Davis was a first lieutenant there when I was in the Zone."

From Bob McCaa we received the following news: "Just a year ago I left the York Ice Machinery Corporation and came to the Magnaflux Corporation, Chicago. I have just been transferred from the engineering department to the sales department, where I am now doing sales engineering work. We make equipment for magnetic inspection of all kinds of ferrous metals and are very busy with the defense program. I'm afraid I won't be able to get east for our tenth reunion. I had only a three-day vacation last summer, and I may get a week in 1942. — Our two youngsters are doing fine. David started kindergarten this fall. He's still a long way from Technology!"

John Lyon wrote from San Diego, Calif.: "While working for the E. G. Budd Manufacturing Company in Philadelphia, I went back to the Institute in 1937 to 1938 for the twelve-month Alfred P. Sloan ['95] Foundation fellowship program in Course XV, and I received a master of science degree. The first year back at the Budd Company I worked in the auto-body die-design department. In July, 1939, they sent me to the navy yard at Mare Island, Calif., to observe and coach the installation of one of our jobs on a destroyer. In the fall, I came back to the coast with my wife and daughter to be western representative, San Diego to Seattle. I do sales engineering, primarily. As we do both navy and aircraft work, it is very interesting these days, and there is plenty to do. We lived in Los Angeles until August and then moved to San Diego. Our second daughter was born on March 1." — CLARENCE M. CHASE, JR., *General Secretary*, 1207 West 7th Street, Plainfield, N.J. CARROLL L. WILSON, *Assistant Secretary*, Research Corporation, 137 Newbury Street, Boston, Mass.

1933

Ellis Littmann called on your Secretary during the summer while in New York on business. He is with Nixdorff-Krein Manufacturing Company, makers of chains. Ellis says that everything is fine and that he sees Sam Baum in Chicago occasionally. Sam is with Truscon Steel Company. Ellis has run across Fred Wehmiller, who is also doing very well.

Bretton Perry dropped us a line to say that he is now assistant to the superintendent of the Maryland factory of the American Can Company. His address is 2908 The Alamead, Baltimore, Md.

Niazi Mostafa would like to hear from some members of Course VI. He wrote to T. C. Johnson and said that he is working sixteen hours a day and cannot promise to write *long* letters or comment on the international situation. His address is 6 Rue Menashe, Meadi, Cairo, Egypt.

Did you know that Don Fink had received an honorary mention award from Eta Kappa Nu, honorary electrical engineering society? The awards are given to young engineers who were graduated not more than ten years ago and who are less than thirty-five years of age. The candidates were judged on their technical, civic, social, and cultural activities. Since 1937, Don has been managing editor of *Electronics* and has written several books, among which are *Engineering Electronics* and *Principles of Television Engineering*. Congratulations, and keep it up!

Congratulations also go to Edward P. Hutchinson, who has been awarded a John Simon Guggenheim Memorial Foundation fellowship to carry on research and creative work for one year. He is now a demographer in the Library of Congress, Washington.

Richard B. Hanley was married to Helen F. Bloomer during the summer and is now living in Hastings-on-Hudson, N.Y. Thomas K. Fitzpatrick was married in the spring to Beverly T. Way. Their address is Rice Institute, Houston, Texas. Robert G. Seyl was married to Margaret Smith of Chicago.

Joseph H. Wetherell was married to Diana E. Gardner in June. Thomas F. Galvin married Rita I. Lagasse in September. August J. Kreuzkamp was married in June to Doris A. Tausch. He is now with the Federal Shipbuilding and Drydock Company. Harper Richards was married to Louise Beville of Washington, D.C. They are now living at 1400 Lake Shore Drive, Chicago, Ill.

Have you heard that late in the spring Fred Murphy became the proud father of a baby girl? That the Clarence Farrs announced the arrival of Richard S. on June 12? Congratulations, all!

Twelve '33 men registered on Alumni Day. Your Secretary regrets that he could not get to Cambridge, for he would have had the pleasure of seeing Peter Alexander, Edward Atkinson, William Baur, C. Wallace Bohrer, William DeCamp, Bob Kimball, John Longley, Dick Morse, Sam Prescott, George Stoll, Warren Webster, and Clarence Westaway.

Cal Mohr sent in the following, for which many thanks: "L. W. Moore, technical assistant, Pan-American Petroleum and Transport Company, has written an article, 'Hydroforming — A New Refining Process,' with D. J. Smith, vice-president, in the April *Chemical and Metallurgical Engineering*."

Here is a letter received this summer from W. W. Laird, Jr. We're sure you'll get as much kick out of it as we did. "I've just returned from a vacation in the Rocky Mountains, where I went on a combination pack trip, fishing expedition, and general exploring party.

"The fishing party started out as a very commonplace cross-country jaunt, but before long assumed the proportions of a left-handed hurricane. There were five stags, any one of whom, by himself, is enough to keep ten counties in a turmoil, so you can imagine the fun we had on the trip.

"In the vestibule of the train one evening we began to sing. Before long we were receiving request numbers from the passengers. The last straw was when the chief steward asked us if we would come and sing again the following night while we were crossing Dakota. We later found out that in Dakota the passengers are not allowed to have cocktails to cheer them. I expect our singing was considered the next best anesthetic.

"Having arrived in the Rockies, we started out with a train of outlaw horses and colts, most of whom seemed to enjoy bucking, rolling, and otherwise demolishing our paraphernalia. If we weren't leaving a trail of eggs or spoons or tarpaulins behind, we were bucking off a bedroll in a stream, or the baked beans down a precipice, or the fishing poles in the bracken. This somewhat impeded our progress in blazing a trail through part of the Montana National Forest Preserve. . . .

"Once we got into Swan River valley, we found the forest much denser than we had thought. Apparently all of the Indians who used to live in the country have moved into town and left the wilds for the white man and the bears. We were given instructions on how to climb trees to avoid the bears and were assured that if a bear chased us up a tree and then followed along after, it was not a grizzly bear. Under these conditions, the fisherman yells as loud as he is able, shakes the tree as violently as possible without throwing himself out, and tries to appeal to the bear's sense of humor about going home and cutting out the nonsense.

"Fortunately we had no personal introductions to the bears. In fact, on only two occasions did we get close enough to them to have the horses neigh, buck, and plunge. — The fishing in many of the lakes is perfectly splendid. Rainbow trout, cutthroats, graylings, and Dolly Vardens predominate. Every day the haul was greater than we could eat. . . .

"The pass which we had intended to cross on our exit had vanished in the clouds. For days we could hardly see the man on the horse ahead of us, and having no idea as to whether we were five thousand or ten thousand feet above sea level, we found it impossible to continue on our circuit, so we turned back, attempting to follow our own blazes. This was not easy either because frequently the rain had swollen the rivers to such an extent that we were unable to ford in the same places we had on the trip in. Twice the horses got caught in the current and were carried downstream fifty yards or more, losing their packs before they could get out. Then the snowbanks melted. . . . Mud was everywhere, and many a

1933 Continued

meadow or clearing where moose grass was growing rank turned out to be a treacherous bog.

"We found that in Montana no one expects rain in June, and our guides, therefore, had no slickers. There was no alternative. We just soaked, and our food soaked, and our beds soaked, and our horses soaked. It is surprising how much water can run into one boot during a few minutes on horseback. Several times I remember getting off my trusty nag and having muddy water squirt out of the lacing holes of my boot. We retraced our steps (covering about one hundred miles, all told) and finally arrived at the Diamond-X Ranch on Flathead Lake, where we stayed for two days before taking the train home again. . . ." — GEORGE HENNING, JR., *General Secretary*, Belmont Smelting and Refining Works, Inc., 330 Belmont Avenue, Brooklyn, N.Y. ROBERT M. KIMBALL, *Assistant Secretary*, Room 3–104, M.I.T., Cambridge, Mass.

1935

Harold Davies has returned to his native England to take part in the defense. — Latest news of Billy Dunn is that he is in Honolulu. — Dick Lawrence has been to New York quite a bit lately and reports having seen Bill Yepsen, who is with the Manufacturers Trust Company. — Jim Notman has left the B. F. Sturtevant Company and is now New England representative for a southern concern selling textile mill equipment. — Gerry Feyling has left the International Nickel Company and is now working for Virginia Smelting Company in West Norfolk, Va.

Charles Mueller and Evelyn Elizabeth Phillips took their vows on September 6. Charlie is a research assistant at the Institute. Charles Goodale married Ann Maher on October 6. By the time this issue reaches you, Vin Mooney and Martha Doherty may be married. Vin is an engineer on development at the General Electric Company in Lynn. I wonder if G. E. is a marriage bureau. Paul Germond and Eleanor Louise Martin took their vows on Saturday, October 18. Paul is working for the Revolvator Company.

Mr. and Mrs. Frederick F. Tone are now the proud parents of a baby girl, Sara Katharine, born on September 8. — John Snow is engaged to marry Frances Talbot. George Kevorkian is engaged to Alice Kavoukjian. And Bill Thompson and Dorothy Cupitt are also engaged.

A letter from Dick Lawrence reported the wedding of Paul Daley to Anne Kuell. Slug is now in the Army. — ROBERT J. GRANBERG, *General Secretary*, care of W. C. Voss, 9 Old Town Road, Wellesley Farms, Mass. RICHARD LAWRENCE, *Assistant Secretary*, 111 Waban Hill Road, North, Chestnut Hill, Mass.

1938

In October, Fran Fisher came up from Wilmington, N.C., where he is working with Karl D. Fernstrom '10 at the new shipyard. Fran has taken back with him his new bride, the former Betty Gammons of Newton Centre.

On October 10, Frank Gardner was married in the Riverside Chapel, New York, to Eleanor Barnum of that city. Fritz Reuter '40 was best man, and Jim Gilliss '40 and Pat Hurley '40 were ushers. Fred Kolb and both of your Secretaries were on hand. After the reception, the clan made an inspection trip to the Morgan's new New Rochelle residence and put its o.k. on the addition to that family.

Aram Kerkian was married last June 23 to Virginia Inman of Attleboro, Mass. Aram is a bacteriologist at the municipal shellfish-treatment plant in Newburyport. — Al Clogston was married to Molly Wyland of Brooklyn on September 6. Al is back at the Institute as a teaching fellow in physics.

Back at the Institute doing chemical research is Ab Byfield. He and his wife, Betty, and their fourteen-months-old baby are living in Watertown. Ed Bentley is also at the Institute, we hear.

Paul Sullivan is in the naval reserve and is at the present time in the naval supply course at the Harvard Business School. Paul was an usher at Ross Teel's marriage to Nancy Marsh on September 13 in Danvers. The Teels are back at their new home in Salem after a wedding trip in the Adirondacks.

Ernie Underwood came east on vacation, but when your Assistant Secretary met him he was just leaving for Chicago Heights, where he is a plant engineer with Inland Steel Company. Harry Weese was also back from Chicago for a few days recently. He was expecting to go into the Navy at any moment.

A grand letter from Lou Bruneau brings us a lot of news: "The mystery man of '38, Bob Treat, got himself hitched on May 9 to Janet Johnston, a gal from out Akron way. Bob is now a supervisor and technical man in Goodyear Tire and Rubber Company's synthetic rubber plant. Address: 1790 24th Street, Cuyahoga Falls, Ohio. — I frequently bump into Teh-Ching Li '37 at lunch hour while roaming around with the wolves of Wall Street (poor, starving creatures). He is getting along nicely with Ebosco Services, Inc. (Electric Bond and Share).

"My engagement is about to be announced to Murial Biza of Glen Rock, N.J. — Ames Bliss '39 left Columbia Broadcasting System and now works for RCA license division laboratories and is currently engaged in defense work. — Jim Viles is doing free-lance photography in New York. He rated a full-page picture in *U. S. Camera* in August. . . . I used to see Frank Kemp regularly last winter on the Brighton Beach subway train. His crimson locks always used to tower over other people's newspapers. Last I heard, he was still a prime mover in the advertising business." — DALE F. MORGAN, *General Secretary*, 142 Woodland Avenue, New Rochelle, N.Y. RICHARD MUTHER, *Assistant Secretary*, Room 1–180, M.I.T., Cambridge, Mass.

1940

R. Spencer Bailey is living at the American Eagle Club, Ltd., in London, England. Malcolm C. Vosburgh is also with the Civilian Technical Corps, but is stationed in Canada. Both of these classmates passed physical examinations and stiff technical exams in order to get into the corps. George Carnrick is in Puerto Rico, a lieutenant with the 66th Coast Artillery, and Richard E. MacPhaul is a lieutenant in the district engineer's office at San Juan, Puerto Rico. Bunlua Jubandhu is with the Royal Thai Air Force, Bangkok, Thailand.

Frank Penn writes saying that his job with E. I. du Pont de Nemours and Company, Inc., in the industrial engineering division, is proving interesting. Frank says that as yet he has not really been broken in on the job, since he has been tied up mainly with a single problem involving shift operation in one of the plant areas. He is doing observation work to determine reasons for reduced production. At present Frank is staying with Nick Carr '39, who is with the American Viscose Corporation, and two other fellows who work for Du Pont.

John Vanderpoel and Joan Waterhouse of Lowell, Mass., were married in the Post Chapel, Barksdale Field, La., September 27. John received his wings and commission as second lieutenant, United States Army Air Corps, after having taken his primary training course in Missouri and his basic training in Texas. He has been assigned to Barksdale Field as an instructor.

Manning A. Smith, who received his Ph.D. with us, has been appointed to the Bowdoin College faculty as an instructor in chemistry. — Theodore A. Edwards has resigned from the Alan Wood Steel Company in Dover, N.J., to go with the Eimco Corporation, whose headquarters are in New York City. — Paul Witherell is now a lieutenant at the Army Air Base, Windsor Locks, Conn. He is base engineer, in charge of airdrome maintenance and of engineer property and supply. Paul says he has met Leo Kiley '39, who is weather officer of the base, and William Aksomitas '37. — Bernie Carver is back in West Lynn, Mass., with the General Electric Company.

Guy meets gal at the Institute! The guy is John K. Ross, and the gal is Helen Bunker. Their marriage took place in September. Eleanor Say became Mrs. Joseph Libsch on September 20, and Eleanor Rodgers was married on August 24 to Albert W. Schlechten.

Norman Klivans wrote an interesting letter concerning his present army status: "About four weeks after my arrival at Chanute Field, Ill., the commanding officer was transferred to another job, and N. R. Klivans became the new C. O., the youngest and greenest commanding officer of the school squadron. There were over two hundred men in the Air Corps outfit and every one of them with over a year's experience. What really saved my neck was the first sergeant, bless him." A few weeks ago Norm was transferred to the general staff of the training command, and he is now in Tulsa, Okla. He has a fine apartment at 20 East Archer Street.

1940 Continued

Alvin Guttag wrote me that he attended the American Chemical Society Convention at Atlantic City and saw Rapoport and Manning Smith there. He also saw Milt Green, who is now working as a chemist for the Atlantic Gelatine Company. Alvin sends me news that Massimo Baer is in the Army, while Maurice Baer is an assistant in the Department of Electrical Engineering at the Institute. Lester Lees completed a graduate year at Technology and is now working for the government in Dayton, Ohio. We understand that Dick Babish is working in New York City for Paramount News. Alvin attended a defense course in the chemistry of powder and explosives at the Polytechnic Institute of Brooklyn in the evenings. Later he accepted a graduate assistantship at Carleton College in Northfield, Minn. All this will lead toward his getting the degree of master of arts next June.

In late October my wife and I visited aboard the U.S.S. *Wasp* while it was at the naval operating base. We had dinner in the officers' mess hall as guests of Val deOlloqui, who is now an ensign. Later we saw a movie aboard ship and were taken over the *Wasp* from the flight deck right on down. Val has had dinner with Bob Hess a time or two and even now is chuckling because the *Wasp* pulled anchor one night when Bob had left an overcoat aboard. Months have passed and the *Belknap*, Bob's ship, has never yet caught up with the *Wasp*. Winter is coming, and Hess will be needing an overcoat for Christmas, fellows. — Send me a letter for a Christmas present and I'll start the new year with a better write-up for your Review. — H. GARRETT WRIGHT, *General Secretary*, 44 Main Street, Hilton Village, Va. THOMAS F. CREAMER, *Assistant Secretary*, Room 3–208, M.I.T., Cambridge, Mass.

1941

Many men have not written in to the Alumni Office about their new addresses. Come on, let's hear where you all are located.

An ex-civilian, Herb Moody, has just called this Secretary to tell of his orders to report for active duty in the Ordnance Corps at Welden Springs, Mo. — Having been assigned to the Quartermaster Depot in Philadelphia, your Secretary was joined by Reid Weedon, Ensign, United States Naval Reserves. Reid is temporarily stationed at the Philadelphia Navy Yard.

In Bangor, Maine, Bill Cadogan is continuing his practice-school work at the Eastern Manufacturing Company. The work is quite a change from the steel mill at Lackawanna, but, Bill says, there's still plenty of chemical engineering to it. Inserted in the letter was news of Jack Lyons' call to duty.

Ed Murphy wrote from Elizabeth, N. J., where he is working for Linde Air Products Company. On a trip home to Boston, Ed met Murray Scott and Herb Moody.— Hank Pohndorf, Irv Foote, and Dave Fleming '40 are at Linde; Ed speaks highly of the work. Mert Richardson is rooming with Boris Miller in Chicago while attending the quartermaster subsistence school. It seems that the next step is Fort Sheridan in December.

Irv Liener is back in the Department of Biology on a fellowship. Leona Norman, after a summer of rest, has entered Boston University School of Medicine. — A card from Hank Avery at Aberdeen Proving Ground tells of other Technology men stationed there: Graffeo '39 and Weinbrenner '40. Others mentioned in the last issue of The Review have since been moved to other stations. — Johan Andersen lives in Hopkinton, Mass., and works for Albert and J. M. Andersen Manufacturing Company in Boston. He manages his farm in the evenings.

Ken Bohr told of Max Schweinshant's job in the research lab of Revere Copper and Brass Company, Rome, N.Y. Walter P. Keith, Jr., and Robert Wilson Blake, Jr., have been ordered to active duty. Exact locations are not known. — Alex Poskus tells us that Bill Butt has left for the Army Air Corps with Art Lowell. No wonder we haven't heard from them of late. Gene Crawford has spent the summer at the Institute with the Navy paying his way — active duty thereafter. Come in, Gene: "Anywhere from Pearl Harbor to Bermuda." — Les Corsa and Ralph Hunt are at American Can Company, Brooklyn. Les is another man who hasn't had enough and is thinking of a career in medicine.

Ed Marden, according to the *Army and Navy Journal* and a long letter, is located at Camp Edwards, Mass., as property, transportation, purchasing, and construction officer. Ed includes information about the M.I.T. construction men: "Doug Watson, who was always more interested in the architectural side of construction than in the building phase, is now building a single home of his own design in his home town of Brookfield Center, Conn. So far Doug has run through two model A's.

"Al Parsons works for Stone and Webster Engineering Corporation about ten miles outside of Cleveland, Ohio. Gene Lawrence is in the Army, along with Paul Joyce. Vic Forzley has left his job in Portland, Maine, but I don't know where he is now."

Back at the Institute, Roy Slaunwhite describes his master's thesis, investigating the preparation of bacterial vaccines by ultraviolet light. Dave Shapiro is in the RCA plant as a junior engineer in civil service. We bumped into Dave this summer and pumped the following information: Milt Sanders is working in Washington on active duty. Neill Wade is with Electrical Research Products, Inc., New York City. Monroe Norden is in Aberdeen, Md., in a civil service job as a statistician. Jiminez-Michelena is back in Venezuela.

Spotted in the *Army and Navy Journal* were the transfers of Charles B. Whitney, Second Lieutenant, from Camp Lee, Va., to office of the quartermaster general, Washington, D.C., on December 20; and Arthur Gingrande, Second Lieutenant, from Fort Monmouth, N.J., to first interceptor command, Mitchell Field, N.Y.

Just forwarded to us was an announcement of the wedding of Judith M. Sprenger to Kenneth Davis last January. A note came from Harold Dato, who had just missed a Technology dinner on July 15 at Radford, Va. He works at the plant being built by the Hercules Powder Company, as do Edward Spinks and John M. Sykes. From Radford, Dates was to travel to Shreveport, La. A press release from the first naval district tells of Ray Fernandez' leaving the Signal Corps for the Naval Air Corps, and of Russell T. Werby's reporting for active duty with the Chemical Warfare Service. Dave Jacobson has just been deferred from the draft and is now at work in Philadelphia.

Ye olde press clippings tell us of the marriages of Virginia Pomazel to Adam J. Miller, II, on June 28; Edna E. Tischendorf to Glen A. Guernsey, United States Naval Reserves; Dorothy Davis on September 6 to Robert S. Williams, now a Lieutenant with the material division of the Air Corps Reserve; Margaret R. Lynch to Walter F. Schuchard on September 27; Jean B. Noyes to Herman E. Gabel. Leon LaBombard was in again as best man at Herman's wedding — third time since school closed. Herman, by the way, is stationed in North Carolina with the Signal Corps.

Steve James had been stationed at the Philadelphia Navy Yard before being ordered to Washington, D.C. As for engagements, we announce those of: Ruth L. Chase to William L. Schubert, Emilie Nelson to Stanley Webber (now back at the Institute), Eleanor Crankshaw to William R. Burke, and Janet Cole to George W. Clark.

Jess Wilson is doing research at Buffalo, N.Y., while Dana Story is home in Essex helping to carry on family tradition in the building of the Gloucester fleet. Ray Koch has been transferred to the office of chief of ordnance, Washington, D.C. — STANLEY BACKER, *General Secretary*, 46 Bicknell Street, Dorchester, Mass. WILLIAM R. AHRENDT, *Assistant Secretary*, The Graduate House, M.I.T., Cambridge, Mass.

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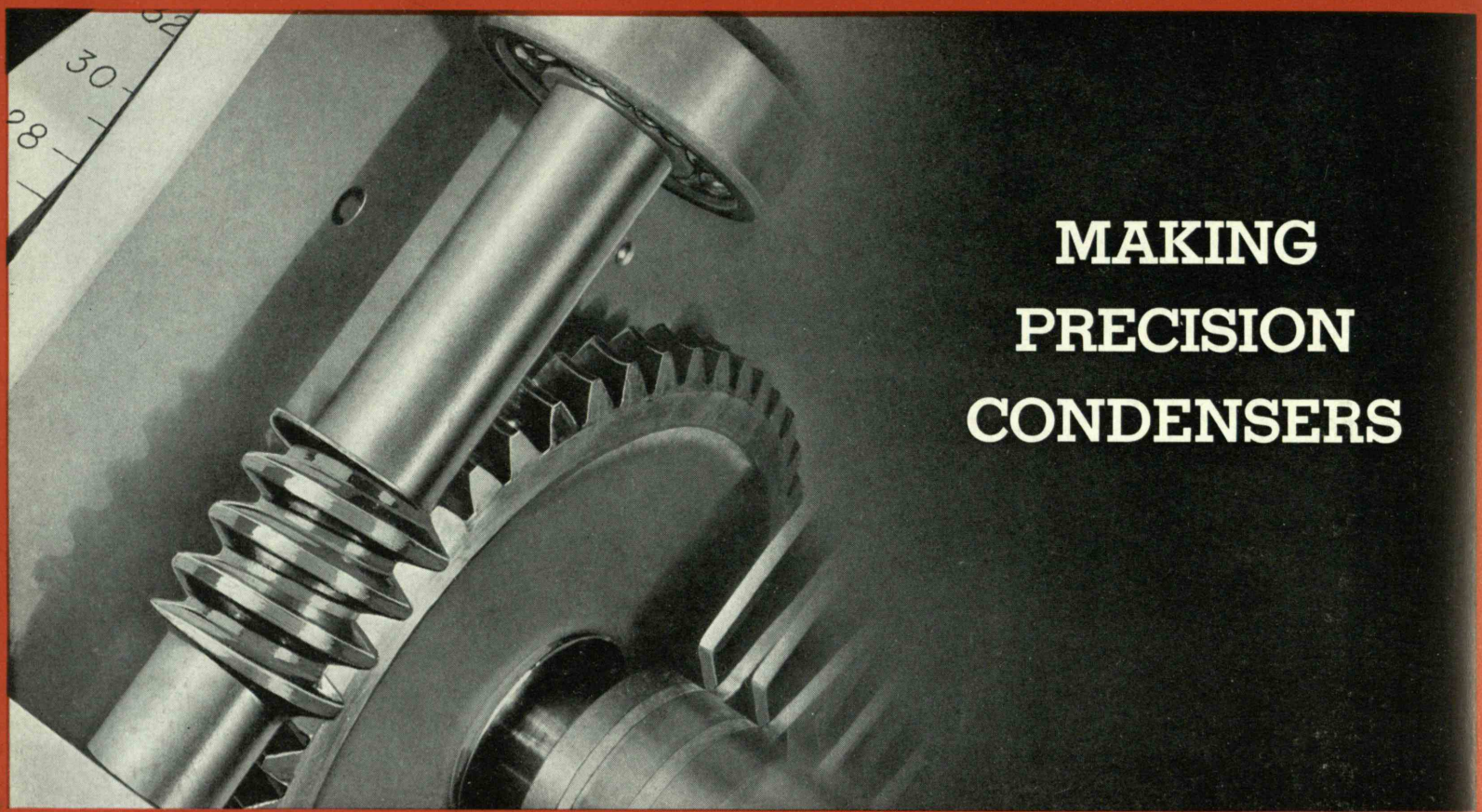

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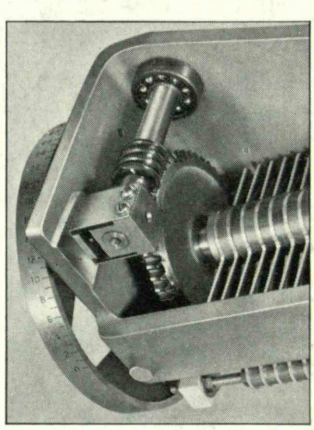

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